

# Dental Materials

**Lamar Institute of  
Technology**

**DHYG 1219**

**Course Syllabus &  
Lab Manual**

**Spring 2018**

**Taught by:  
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## LECTURE SCHEDULE

1 <sup>st</sup> week		Review Syllabi and Lab Manual
2 <sup>nd</sup> week	CH 1	Introduction
3 <sup>rd</sup> week	CH 2	Materials Science and Dentistry
4 <sup>th</sup> week	CH 3	Physical and Mechanical Properties of Dental Materials
5 <sup>th</sup> week	<b>Test#1</b>	<b>(Chapters 1, 2, 3) Amalgam and Direct Gold</b>
6 <sup>th</sup> week	CH 4 CH5	Adhesive Materials Direct Polymeric Restorative Materials Dental Cements
7 <sup>th</sup> week	CH 6	Amalgam and Direct Gold Elastomeric Impression (cont'd)
8 <sup>th</sup> week	<b>Test #2</b>	<b>(Chapters 4, 5, 6)</b>
	Spring Break	
9 <sup>th</sup> week	CH 7	Dental Cements
10 <sup>th</sup> week	CH 8	Impression Materials
11 <sup>th</sup> week	CH 9 CH 10	Gypsum Materials Materials for Fixed Indirect Restorations and Prostheses
12 <sup>th</sup> week	<b>TEST #3</b>	<b>(Chapters 7, 8, 9, 10)</b>
13 <sup>th</sup> week	CH 11 CH 13	Removable Prostheses and Acrylic Resins Specialty Materials
14 <sup>th</sup> week	CH 14 CH 19	Clinical Detection and Management of Dental Restorative Materials During Scaling and Polishing Instruments as Dental Materials
15 <sup>th</sup> week	CH 16	Polishing Materials and Abrasion
16 <sup>th</sup> week	<b>TEST #4</b>	<b>(Chapters 11, 13, 14, 16, 19)</b>

### LABORATORY SCHEDULE

Date	Topic	Assignments (to be completed prior to lab)
1st week	Introduction to Safety	
	Desensitization	Wilkins, 713-724
2 <sup>nd</sup> week	Denture Cleaning	Wilkins, Pg 475-480
	Topical Anesthetic	Wilkins, 604-607
3 <sup>rd</sup> week	Periodontal Dressing - Bring Typodont	Wilkins, Pg 705-710
4 <sup>th</sup> week	Amalgam Manipulation (demonstration)	Wilkins, Pg 742-750
	Tofflemire Matrix & Retainer (bring typodont)	Handout
5 <sup>th</sup> week	Amalgam Polishing (demonstration)	Wilkins, Pg 747-751
	Brush Biopsy	Handout
<b>6<sup>th</sup> week</b>	<b>Lab Practical #1</b>	
7 <sup>th</sup> week	Suture Removal	Wilkins, 699-705
	Pulp Vitality Testing	Wilkins, 273-276 Handout
8 <sup>th</sup> week	Mixing Alginate/Taking Impressions	Wilkins, 189-205 Handout
	Model Trimming	
9 <sup>th</sup> week	Mixing Alginate/Taking Impressions - continued	
10 <sup>th</sup> week	Bleaching Tray Construction	
11 <sup>th</sup> week	Pit & Fissure Sealants	Wilkins, 569-777
12 <sup>th</sup> week	Pit & Fissure Sealants (continued)	
<b>13<sup>th</sup> week</b>	<b>Sealant Lab (in clinic)</b>	
	<b>Lab Practical #2</b>	

## COURSE DESCRIPTION

DHYG 1219 is a study of the physical and chemical properties of dental materials including the application and manipulation of the various materials used in dentistry.

## COURSE OBJECTIVES

At the completion of this course, the student will be able to demonstrate the following as evidenced by satisfactorily (75% or above) examination, quiz and assignment grades:

1. Relate the physical, chemical and mechanical characteristics of all dental materials studied.
2. Demonstrate proficiency in the manipulation techniques of dental materials.
3. Demonstrate knowledge of the correct terminology in dealing with dental materials.
4. Demonstrate safety practices in dealing with dental materials.

## CREDIT HOURS

Lecture	1 hour
Laboratory	3 hours
Course Credit	2 semester hours

**PREREQUISITE:** Admission to the Dental Hygiene Program

## COURSE POLICIES

### General Requirements

1. **Preparation.** During this course it is expected that the student prepare for class. This includes reading or viewing the information to be discussed the day prior to coming to class.
2. **Assignments.** All assignments and laboratory projects are to be turned in on the due date. All lecture assignments are to be completed on Blackboard. Late assignments will not be accepted. Assignments which are not turned in or incomplete will result in a grade of '0' and could result in an incomplete grade in this course.
3. **Attendance.** In order to ensure the students in the dental hygiene program achieve the necessary didactic and laboratory competencies outlined in the curriculum, it is necessary that the student complete all assigned lecture classes and laboratory hours.

If you are unable to attend lecture class or lab, it is mandatory that you call the appropriate instructor prior to the scheduled class or lab time. The student is responsible for all material missed at the time of absence. Extenuating circumstances will be taken into account. Extenuating circumstances might include: funeral of immediate family member, maternity, hospitalization, etc.

It is expected that students will appear to take their exams at the regularly scheduled examination time. Make-up examinations will be given only if the absence is due to illness (confirmed by a physicians' excuse), a death in the immediate family, or at the discretion of the instructor.

Dental hygiene students will be allowed two absences in any lecture or lab. Absences must be accompanied by a written excuse on the next class day. In the event that a student misses class or lab beyond the allowed absences, the following policy will be enforced:

2 absences = verbal warning

3 absences = written warning with the Disciplinary Action Form (DAF)

4 absences = grade will be lowered one full letter grade

4. **Tardiness.** Tardiness is disruptive to the instructor and the students in the classroom. It is expected that students will arrive on time for class or lab, and remain until dismissed by the instructor. If tardiness becomes an issue, the following policy will be enforced:  
Tardy 1 time = verbal warning  
Tardy 2 times is considered an absence
5. **Electronic Equipment.** Electronic equipment such as telephones, pagers, and audio/video equipment are not allowed in the classroom. No text messaging during class.
6. **Examination and Quiz Policy.** Examinations will be based on objectives, lecture notes, handouts, assigned readings, audiovisual material and class discussions. The final examination will be comprehensive and consist of questions similar to those found on the major examinations.  
Students are expected to complete examinations as scheduled. Make-up examinations will be given only if the absence is due to illness (verified by physicians excuse), a death in the immediate family, or at the discretion of the Instructor. All make-up examinations must be taken with two (2) weeks from the scheduled exam date. All examinations will be kept on file by the Instructor. Students may have access to the examination by appointment during the Instructor's office hours. Exams may be reviewed up to two (2) weeks following the exam date.

### **DISABILITIES STATEMENT**

The Americans with Disabilities Act of 1992 and Section 504 of the rehabilitation Act of 1973 are federal anti-discrimination statutes that provide comprehensive civil rights for persons with disabilities. Among other things, these statutes require that all students with documented disabilities be guaranteed a learning environment that provides for reasonable accommodations for their disabilities.

If you believe you have a disability requiring an accommodation, please contact the Special Populations Coordinator, Jamie Fox, at 409-880-1737 or visit her office located in the Cecil Beeson Building, room 116B.

### **REQUIRED TEXT**

Gladwin, Marcia and Bagby, Michael. (2013). Clinical Aspects of Dental Materials. Lippincott Williams & Wilkins, 4<sup>th</sup> Edition. ISBN 978-1-60913-965-0

### **REFERENCE MATERIALS**

Phillips, MS, DSc, R.W., B.K. Moore, PhD. (1994). Elements of Dental Materials For Dental Hygienists and Assistants. W. B. Saunders Co., 5<sup>th</sup> edition.

Craig, R.G., J.M. Powers, and J.C. Wataha. (2000). Dental Materials, Properties, and Manipulation, 7<sup>th</sup> Ed. The CV Mosby Company: St. Louis.

Wilkins, E.M. (2002). Clinical Practice of the Dental Hygienist. Lea & Febiger: Philadelphia.

Ferracane, J.L. (2001). Materials in Dentistry, Principles and Applications. J.B. Lippincott Company: Philadelphia.

## COURSE REQUIREMENTS

### Lecture Requirements:

1. **Test Requirements.** The following information is a list of the lecture requirements. They may vary, depending upon the needs of the class as a whole.
  - a. Tests
    1. 4 unit tests
2. **Class Assignments.** All class assignments will be completed on Blackboard. Late assignments will not be accepted. There will be a total of 10 assignments during the semester.
3. **Class Participation.** It is expected that every student will come to class prepared and ready to discuss reading assignment and outside assignments. A class participation rubric will be handed out in class.

### Laboratory Requirements.

1. **Skill evaluations.** Successful completion of the following competency exams is necessary for completion of the course: Suture Removal, Topical Anesthetic Application, Desensitization of Hard Tissue, Vitality Testing, Periodontal Dressing (Placement & Removal). Competency must be met in order to meet the course requirements.
2. **Competency exams.** Successful completion of competency exams is required for course completion. The two competency exams are Pit and Fissure Sealants and Bleaching Tray Construction.
3. **Assignments.** Completion of laboratory exercises other than skill evaluations must be achieved and must meet the competency levels.
4. **Safety.** The appropriate safety principles and equipment **must** be utilized during laboratory sessions. The equipment may include gloves, safety glasses, face masks, and lab coats with name badges. Unless specified, this equipment **must** be worn during lab.

## EVALUATION CRITERIA

<b>Lecture Grade Determination:</b>	
Test average	60%
Class Participation	10%
Assignments	10%
<b>Laboratory Grade Determination:</b>	
Skill Evaluations	Completion
Pit and Fissure Sealants Competency Evaluation	Completion
Lab Practical Exams (2)	15%
Worksheets (3)	5%

**GRADE SCALE**

<b>A</b>	<b>92-100</b>
<b>B</b>	<b>83-91</b>
<b>C</b>	<b>75-82</b>
<b>D</b>	<b>60-74</b>
<b>F</b>	<b>Below 60</b>

**COMPETENCY LEVELS**

**Lecture:**

You must have a minimum grade of 75% to pass this course in order to progress in the Dental Hygiene program.

**Laboratory:**

Skill Evaluations:	
Suture Removal	Demonstrate laboratory competency
Topical Anesthetic Application	Demonstrate laboratory competency
Desensitization of Hard Tissue	Demonstrate laboratory competency
Vitality Testing	Demonstrate laboratory competency
Periodontal Dressings: Placement & Removal	Demonstrate laboratory competency
Worksheets:	
Study Models	Worksheet
Periodontal Dressings: Mixing	Worksheet
Competency Exams:	
Pit & Fissure Sealants	Demonstrate clinical competency
Bleaching Tray	Demonstrate laboratory competency

## CONTENT OUTLINE

- I. Introduction
  - a. Rationale for Studying Dental Materials
  - b. Biomaterials and the Oral Environment
  - c. History and Selection of Dental Materials
  - d. Standards for Dental Materials
  - e. Classification of Dental Materials
  - f. Classification of Dental Caries and Restorations
- II. Materials Science and Dentistry
  - a. Materials Science
  - b. Atomic Bonding
  - c. Materials and Their Atomic Bonds
- III. Physical and Mechanical Properties of Dental Materials
  - a. Properties of Materials
  - b. Physical Properties
  - c. Mechanical Properties
- IV. Adhesive Materials
  - a. Adhesive Materials in Dentistry
  - b. Acid Etching
  - c. Dentinal Bonding
  - d. Glass Ionomers
  - e. Uses of Bonding in Dentistry
- V. Direct Polymeric Restorative Materials
  - a. Acrylic Resins
  - b. Inhibitors and Competing Reactions
  - c. Problems with Unfilled Resins
  - d. Improvements to Dental Resins
  - e. Composite Materials
  - f. Glass Ionomer Materials
  - g. Compomers
  - h. Selecting Restorative Materials
- VI. Amalgam and Direct Gold
  - a. What is Dental Amalgam
  - b. Advantages of Using Dental Amalgam
  - c. History of Dental Amalgam
  - d. Factors Affecting Handling and Performance
  - e. Amalgam Properties
  - f. Use of Dental Amalgam
  - g. Direct Gold Restorations
- VII. Dental Cements
  - a. Use of Dental Cements
  - b. Chemistry of Dental Cements
  - c. Powders Used in Dental Cements
  - d. Liquids Used in Dental Cements
  - e. Powder/Liquid Ratios and Systems of Dental Cements
  - f. ZOE Cement
  - g. Periodontal and Other Surgical Materials
- g. Zinc Phosphate Cement
- h. Glass Ionomer Cements
- i. Polycarboxylate Cement
- j. Other Dental Cements and Cement Uses
- VIII. Impression Materials
  - a. Impression Materials
  - b. Plaster
  - c. Wax and Impression Compound
  - d. Zinc Oxide-Eugenol (ZOE)
  - e. General Aspects of Hydrocolloid Impression Materials
  - f. Alginate Impression Materials
  - g. Agar
  - h. General Aspects of Nonaqueous Elastomeric Impression Materials
  - i. Polysulfides
  - j. Condensation Silicones
  - k. Polyethers
  - l. Addition Silicones
- IX. Gypsum Materials
  - a. Desirable Properties
  - b. Types of Gypsum Products
  - c. Setting Reaction
  - d. Setting Time
  - e. Setting Expansion
  - f. Strength
  - g. Surface Hardness
  - h. Dimensional Stability
- X. Materials for Fixed Indirect Restorations and Prostheses
  - a. Types of Fixed Indirect Restorations
  - b. Classification by Amount of Tooth Structure Restored
  - c. Classification by Material
  - d. Procedures for Constructing an Indirect Restoration
  - e. Casting Process
  - f. Alloys for All-Metal Cast Restorations
  - g. Titanium
  - h. Partial Denture Frameworks
  - i. Ceramic Restorative Materials
  - j. Advantages and Disadvantages
- XI. Removable Prostheses and Acrylic Resins
  - a. Acrylic Resins
  - b. Acrylic Resin Systems Used in Dentistry
  - c. Complete Dentures
  - d. Constructing a Complete Denture
  - e. Partial Dentures
  - f. Relining a Denture
  - g. Immediate Dentures
  - h. Repairing Acrylic Prostheses or Appliances
  - i. Handling Acrylic Devices
- XII. Specialty Materials
  - a. Orthodontic Materials
  - b. Endodontic Materials
- XIII. Clinical Detection and Management of Dental Restorative Materials During Scaling and



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- Polishing
  - a. Clinical Detection of Tooth Structure and Dental Restorative Materials
  - b. Suggestions for Polishing Specific Restorative Materials
- XIV. Polishing Materials and Abrasion
  - a. Definitions
  - b. Types of Abrasives
  - c. Bonded and Coated Abrasives
  - d. Factors Affecting the Rate of Abrasion
  - e. The Polishing Process
  - f. Prophylaxis Pastes
  - g. Air Powder Polishing
  - h. Implants
  - i. Denture Cleansers
  - j. Dentifrices
- XV. Tooth Whitening
  - a. Treatment Options: Restoration or Whitening
  - b. Causes of Tooth Discoloration
  - c. Whitening Agents
  - d. Whitening Techniques
  - e. Side Effects of Whitening
  - f. Concerns for the Dental Hygienist
- XVIII. Disinfection of Impressions, Dentures, and Other Appliances and Materials
  - a. Disinfection of Impressions
  - b. Disinfecting Dentures and Other Appliances
  - c. Infection control Protocol for Grinding and Polishing Dentures
- XIX. General Rules for Handling Dental Materials
  - a. Follow the Manufacturer's Directions
  - b. Mixing and Setting Times
  - c. Dispensing Materials
  - d. Mixing
  - e. Light-Activated Materials
  - f. Contamination