

# El Paso Community College

## Syllabus

### Part II

## Official Course Description

<b>SUBJECT AREA</b>	<u>Dental Hygiene</u>
<b>COURSE RUBRIC AND NUMBER</b>	<u>DHYG 1219</u>
<b>COURSE TITLE</b>	<u>Dental Materials</u>
<b>COURSE CREDIT HOURS</b>	<u>2                      2                      :                      1</u> Credits                      Lec                      Lab

### I. Catalog Description

Studies the physical and chemical properties of dental materials including the application and manipulation of the various materials used in dentistry. A grade of "C" or better is required in this course to take the next course. **Prerequisites:** BIOL 2401 and BIOL 2402 and CHEM 1306 and 1106. **Corequisites:** DHYG 1103 and DHYG 1201 and DHYG 1239 and DHYG 1304 and DHYG 1431. (2:1). Lab fee.

### II. Course Objectives

#### THEORY

- A. Unit I. Introduction to Dental Materials
1. Discuss the overall goal of a course in dental materials and its importance in the education of the dental health care professional.
  2. Discuss conditions that make the oral cavity a hostile environment.
  3. Identify the characteristics or properties a dental material must possess to survive in the oral cavity.
  4. Explain how organizations evaluate and/or classify dental drugs, materials, instruments, and equipment.
  5. Name and discuss the categories into which dental materials are classified.
  6. Identify the locations of all six cavity classifications and the appropriate restorative material to be used for each. Include the following in your discussion:
    - Anterior and/or posterior
    - Involvement of incisal angle
    - Involvement of proximal surface
    - Smooth surfaces versus pit and fissures
  7. Describe or define the key words and phrases found in the text or in the lecture.
- B. Unit II. Materials Science and Dentistry
1. Discuss the phases into which materials are classified.
  2. Explain the basic differences between primary and secondary bonds.
  3. Name the three types of primary bonds and describe the differences between them.
  4. Contrast the bonding characteristics of metals, ceramics, plastics, and composites.
  5. Describe or define the key words and phrases found in the text or in the lecture.

- C. Unit III. Physical and Mechanical Properties of Dental Materials
1. Discuss the physical properties of dental materials.
  2. Define wetting in reference to liquids and why a drop may or may not bead up on a surface.
  3. Discuss the term and unit of measure for the following properties:
    - Density
    - Heat capacity
    - Coefficient of thermal expansion
    - Stress
    - Strain
    - Modules of elasticity
  4. Define “proportional limit” and discuss two other equivalent terms.
  5. Name and discuss the four types of stress. Provide examples used in everyday life.
  6. Describe bending stress to which dental materials are subjected.
  7. Compare the properties of toughness and hardness. Provide examples used in everyday life.
  8. Discuss the differences between stress relaxation and creep.
  9. Discuss stress concentration and compare its effects on a poorly placed amalgam restoration as well as on a properly placed one.
  10. Describe or define the key words and phrases found in the text or in the lecture.
- D. Unit IV. Gypsum Materials
1. Discuss the major differences between dental plaster, stone, and improved stone.
  2. Explain the meaning of initial and final setting times.
  3. List three examples of how to increase and decrease the setting times of gypsum products.
  4. Discuss wet and dry strength as it relates to gypsum products.
  5. Discuss the recommended techniques for the use of gypsum products in relation to measuring, mixing, and pouring an impression.
  6. Describe or define the key words and phrases found in the text or in the lecture.
- E. Unit V. Impression Materials
1. Discuss the use of impression materials.
  2. List the oral structures of which impressions are made.
  3. Describe the various types of impression trays and their use.
  4. Discuss the ideal qualities of an impression material.
  5. Differentiate between:
    - Elastic and inelastic impression materials
    - Reversible and irreversible impression materials
  6. Describe the composition and setting mechanism of the following:
    - Wax and impression compounds
    - Zinc oxide-eugenol (ZOE)
    - Agar or reversible hydrocolloid
    - Alginate
    - Polysulfides
    - Condensation silicones
    - Polyethers
    - Addition silicones
  7. Compare the relative properties, use, and cost of the above impression materials.
  8. Describe the effect of water temperature on the setting rate of alginate.
  9. Describe the effect of water and heat on the setting rate of polysulfides.
  10. Describe or define the key words and phrases found in the text or in the lecture.
- F. Unit VI. Dental Cements
1. Describe the use of dental cements as a
    - Luting agent
    - Base
    - Liner

- Restorative material
  - Temporary restoration
  - Periodontal pack
  - Temporary cement
  - Cavity varnish
2. Explain the importance of adhesion and microleakage to the clinical use of a dental cement.
  3. Discuss the difference between a base and a liner.
  4. Describe the use of a cavity varnish or cavity sealer.
  5. Describe the properties of the component liquids and powders of dental cements.
  6. Explain the setting reaction of a typical dental cement.
  7. Based on the properties of the liquid and powder, discuss the properties of
    - Zinc oxide-eugenol (ZOE) cement
    - Zinc phosphate cement
    - Polycarboxylate cement
    - Glass ionomer cement
    - Calcium hydroxide base
  8. Discuss the mixing process for cements, bases, and liners.
  9. Describe or define the key words and phrases found in the text or in the lecture.
- G. Unit VII. Amalgam and Other Direct Metallic Restorative Materials
1. Differentiate between an amalgam alloy and a dental amalgam.
  2. Discuss the principle of cavity preparation for an amalgam preparation.
  3. Discuss the composition of conventional and high-copper dental amalgams.
  4. Describe the function of the major elements of a dental amalgam.
  5. Discuss the self-sealing properties of an amalgam.
  6. Describe the following particle shapes of amalgam alloy particles:
    - Lathe cut
    - Spherical
    - Blend or admix
  7. Describe the effect of moisture contamination on amalgams.
  8. Explain the trituration and setting processes.
  9. Describe the reactions involved in both conventional and high-copper amalgams.
  10. Discuss the composition, relative strength, and corrosion resistance for amalgam.
  11. Discuss acceptable mercury hygiene practices.
  12. Discuss the manipulation of dental amalgam.
  13. Describe or define the key words and phrases found in the text or in the lecture.
- H. Unit VIII. Adhesive Materials
1. Describe an adhesive material.
  2. Explain the difference between micromechanical bonding and macromechanical bonding.
  3. Discuss the benefits of restorations that are bonded to tooth structure.
  4. Compare the differences of the microanatomy of enamel and dentin regarding etching and bonding of the following:
    - Orthophosphoric acid
    - Enamel tags
    - Smear layer
    - Primer
    - Adhesive
  1. Discuss the early fallacies about dentinal bonding and how research has changed current practices.
  2. Discuss the differences between glass ionomer cements and dentinal bonding agents.
  3. Describe or define the key words and phrases found in the text or in the lecture.
- I. Unit IX. Direct Polymeric (Esthetic) Restorative Materials
1. Discuss the two types of polymerization reactions that are commonly seen in dental

- materials.
2. Discuss the following properties of restorative resins:
    - Polymerization shrinkage
    - Coefficient of thermal expansion
    - Abrasion resistance
  3. Discuss the relationship between the filler particle, the matrix, and the coupling agent of a composite restorative material.
  4. Compare the advantages and disadvantages of light-cure and chemical-cure composite materials.
  5. Discuss the importance of proper eye protection when using light-curing dental materials.
  6. Discuss the importance of the following procedures and/or characteristics of dental composites:
    - Depth of cure
    - Addition of material in increments
    - Inhibition by air
    - Unreacted C=C bonds
    - Shades
    - Shortcomings of the matrix
  7. Discuss the importance of the following properties in relation to the fillers found in dental composites:
    - Composition
    - Size
    - Amount
    - Abrasion resistance
    - Refractive index
    - Clinical detection
  8. Discuss the use of dental composites in various dental settings and cavity preparations.
  9. Discuss the rationale between flowable and condensable composites.
  10. Discuss the role the dental hygienist plays in the placement and maintenance of pit and fissure sealants.
  11. Discuss “preventive resin restoration” and “composite cements.”
  12. Discuss the characteristics of light-cure and chemical-cure ionomer cements.
  13. Summarize the recommended guidelines for light curing dental materials.
  14. Discuss the similarities between compomers, glass ionomers, and composites.
  15. Describe or define the key words and phrases found in the text or in the lecture.
- J. Unit X. Pit and Fissure Sealants
1. Discuss the factors determining the success of a sealant.
  2. List the indications and contraindications for applying a sealant.
  3. Discuss the acceptable, but different, methods for preparing the enamel surface for a sealant.
  4. Summarize the steps of applying a sealant.
  5. Evaluate a placed sealant regarding proper isolation, coverage, and defects.
  7. Explain the importance of recall visits for sealant maintenance.
  8. Summarize how to explain to a parent the need for sealants on a child patient. Provide rationale, procedure, time involved, and prognosis.
  9. Describe or define the key words and phrases found in the text or in lecture.
- K. Unit XI. Polishing and Abrasive Materials
1. Discuss the following terms:
    - Cutting
    - Abrasion
    - Finishing
    - Polishing
    - Abrasive
  2. Discuss uses of abrasives clinically or in laboratory procedures.
  3. Summarize the factors that may influence the rate of abrasion and explain why the hygienist

- must have a clear understanding of these factors in the delivery of patient care.
4. Discuss the reasons that tooth structure and restorations are polished.
  5. Discuss the polishing process, including the series of steps, scratches produced, and the wavelength of visible light.
  6. Discuss selective polishing.
  7. Discuss the characteristics of an acceptable prophylaxis paste.
  8. Discuss the difference between a cleaning agent and a polishing agent.
9. Describe or define the key words and phrases found in the text or in the lecture.
- L. Unit XII. Oral Appliances
1. List and discuss the reason for the use of the different types of oral appliances used in the dental profession.
  2. Discuss the different thermoplastic materials used in the fabrication of oral appliances and discuss their properties.
  3. Explain the steps involved in fabricating an oral appliance.
  4. Discuss the proper maintenance of oral appliances.
  5. Prepare a script that may be used for patient education regarding oral appliances.
  6. Describe or define the key words and phrases found in the text or in the lecture.
- M. Unit XIII. Tooth Whitening
1. Define tooth bleaching and explain the difference between vital and nonvital tooth bleaching.
  2. Discuss the difference between intrinsic and extrinsic stains and give examples of each.
  3. Name chemical agents used for vital tooth whitening and explain the process by which whitening agents bleach teeth.
  4. List the factors that affect the success of tooth whitening.
  5. Compare and contrast patient-applied and professionally applied vital whitening. Be familiar with what the ADA states on the safety and efficacy of tooth whitening.
  6. Discuss measures to prevent or alleviate tooth whitening side effects.
  7. Describe or define the key words and phrases found in the text or in the lecture.
- N. Unit XIV. Vital Tooth Whitening: Patient-Applied, Professionally Supervised Clinical and Laboratory Procedures
1. Discuss indications and contraindications for use of patient-applied, professionally supervised whitening technique.
  2. Discuss indications and contraindications for professionally applied power whitening techniques.
  3. Outline the steps in the clinical phase of patient-applied, professionally supervised vital whitening technique.
  4. Discuss home care instructions for the patient using professionally supervised, self-applied technique.
  5. Describe the steps in construction of the whitening tray and identify the equipment and materials used.
  6. Describe the steps in the professionally applied power whitening technique and identify materials and equipment used.
- O. Unit XV. Fixed Indirect Restorations and Prostheses
1. Discuss fixed indirect restorations and factors that affect treatment planning.
  2. Discuss the advantages and disadvantages of all-metal crowns, ceramometal crowns, and all-ceramic restorations.
  3. Discuss the lost wax casting technique used to fabricate metal restorations.
  4. Describe the types of alloys used to fabricate all metal crowns, ceramometal crowns, and partial denture frameworks.
  5. Discuss the types of porcelain used to simulate tooth color.
  7. Describe or define the key words and phrases found in the text or in lecture.

- P. Unit XVI. Removable Protheses and Acrylic Resins
1. Discuss the use of acrylic resins in dentistry.
  2. Explain the physical and chemical stages of polymerization of acrylic resins.
  3. Discuss the function of the components of heat-cure and cold-cure acrylic resin systems.
  4. Describe the steps involved in the construction of a denture.
  5. Summarize the procedures used to reline a denture.
  6. Describe or define the key words and phrases found in the text or in the lecture.
- Q. Unit XVII. Detection and Management of Restorative Materials during Scaling and Polishing
1. Distinguish between porcelain and composite restorations.
  2. Distinguish between tooth tissue and restorative materials using the following criteria:
    - Radiographic characteristics
    - Surface smoothness
    - Tactile and auditory sensations
    - Location
  3. Describe common procedures routinely performed by a dental hygienist that could be detrimental to teeth and restorative materials.
  4. Identify the recommended instrumentation technique around margins of cast restorations.
  5. Explain the causes of possible scaling-and-polishing protocol for a patient with the following oral findings:
    - 4 mm of recessed gingiva
    - Class V glass ionomer restorations in the maxillary left quadrant
    - Two gold crowns in the mandibular right quadrant
    - Three composite restorations in the maxillary anterior segment
  6. Describe or define the key words and phrases found in the text or in the lecture.

## **LABORATORY**

- A. Laboratory Assignments are composed of these topics:
- Sealant materials
  - Gypsum products
  - Impression materials
  - Dental cements, bases, and liners
  - Amalgam restorative materials
  - Polymeric restorative materials
  - Oral appliances
  - Tooth whitening
  - Polishing and abrasive materials

## **III. THECB Learning Outcomes (ACGM) (WECM)**

Upon successful completion of this course, students will:

1. Differentiate between the various types of dental materials and their respective properties.
2. Manipulate materials used in dentistry.

## **IV. Evaluation**

### **1. Grading Requirements**

- Students must be prepared for class discussion prior to class and laboratory.

**2. Evaluation Methods and Overall Course Weights**

**Lecture Weight 80%**

- Six (6) Written Exams 60%  
Based on lectures, stated unit cognitive objectives, and reading assignments
- Quizzes 25%  
Will be announced and unannounced. Scores from all quizzes will be averaged and added as one major exam at the end of the term.
- Final Exam 15%

**Total: 100%**

**Lab Weight 20%**

- Laboratory Unit Quizzes: 80%
- Practical Evaluations: 20%

**Total: 100%**

**3. Grading Scale:**

- A = 100 – 93
- B = 92 – 83
- C = 82 – 75
- D = 74 – 70
- F = 69 and below

*\*The minimum acceptable numerical number is a 75 as determined by the program's promotion and graduation policies.*

**4. Remediation**

The instructor will provide individual procedures for students needing remediation. Unexcused absences may result in a grade reduction or no retake of exams. Such procedures will be discussed with the student(s) and assignments will be provided.

**V. PROGRAM COMPETENCIES FROM CODA (COMMISSION OF DENTAL ACCREDITATION)**

ADDRESSED IN THIS COURSE

- C.5 Assume responsibility for professional actions and care based on accepted scientific theories, research, and the accepted standard of care.

**VI. Disability Statement (Americans with Disabilities Act [ADA])**

EPCC offers a variety of services to persons with documented sensory, mental, physical, or temporary disabling conditions to promote success in classes. If you have a disability and believe you may need services, you are encouraged to contact the Center for Students with Disabilities to discuss your needs with a counselor. All discussions and documentation are kept confidential. Offices located: VV Rm C-112 (831-2426); TM Rm 1400 (831-5808); RG Rm B-201 (831-4198); NWC Rm M-54 (831-8815); and MDP Rm A-125 (831-7024).

**VII. 6 Drop Rule**

Students who began attending Texas public institutions of higher education for the first time during the fall 2007 semester or later are subject to a 6-Drop limit for all undergraduate classes. Developmental, ESL, Dual Credit and Early College High School classes are exempt from this rule. All students should consult with their instructor before dropping a class. Academic assistance is available. Students are encouraged to see Counseling Services if dropping because exemptions may apply. Refer to the EPCC catalog and website for additional information.

## **VIII. Title IX and Sex Discrimination**

Title 9 (20 U.S.C. 1681 & 34 C.F.R. Part 106) states the following "No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any educational program or activity receiving Federal financial assistance." The Violence Against Women Act (VAWA) prohibits stalking, date violence, sexual violence, and domestic violence for all students, employees and visitors (male and female). If you have any concerns related to discrimination, harassment, or assault (of any type) you can contact the Assistant to the Vice President for Student and Enrollment Services at 915-831-2655. Employees can call the Manager of Employee Relations at 915-831-6458. Reports of sexual assault/violence may also be reported to EPCC Police at 915-831-2200.