

El Paso Community College
Syllabus
Part II
Official Course Description

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|---------------------------------|--|----------|----------|---|----------|---------|-----|--|-----|
| SUBJECT AREA | <u>Dental Hygiene</u> | | | | | | | | |
| COURSE RUBRIC AND NUMBER | <u>DHYG 1219</u> | | | | | | | | |
| COURSE TITLE | <u>Dental Materials</u> | | | | | | | | |
| COURSE CREDIT HOURS | <table border="0" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;"><u>2</u></td> <td style="text-align: center;"><u>2</u></td> <td style="text-align: center;">:</td> <td style="text-align: center;"><u>1</u></td> </tr> <tr> <td style="text-align: center;">Credits</td> <td style="text-align: center;">Lec</td> <td></td> <td style="text-align: center;">Lab</td> </tr> </table> | <u>2</u> | <u>2</u> | : | <u>1</u> | Credits | Lec | | Lab |
| <u>2</u> | <u>2</u> | : | <u>1</u> | | | | | | |
| Credits | Lec | | Lab | | | | | | |

I. Catalog Description

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: DHYG 1239 and DHYG 1301 and DHYG 1304 and DHYG 1431. Corequisites: DHYG 1235 and DHYG 1261 and DHYG 1311 and DHYG 2201. (2:1). Lab fee.**

II. Course Objectives for Theory and Laboratory

- A. Unit I. Introduction to Dental Materials**
 1. Summarize the reasons why a dental hygienist should be knowledgeable in the science of dental materials.
 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.
 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. Summarize the similarities and differences of secondary bonds, which include permanent dipoles, hydrogen bonds, and fluctuating dipoles.
 5. Contrast the bonding characteristics of metals, ceramics, plastics, and composites.

- C. Unit III. Physical and Mechanical Properties of Dental Materials**
 1. Discuss the physical properties of dental materials.
 2. Define wetting in reference to liquid 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 when 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. 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
5. Discuss the early fallacies about dentinal bonding and how research has changed current practices.
6. Discuss the differences between glass ionomer cements and dentinal bonding agents.
7. Describe or define the key words and phrases found in the text or in the lecture.

E. Unit V. Direct Polymeric 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 advantage 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.

F. Unit VI. Application and Removal of the Rubber Dam

1. List the indications and contraindications for placing the rubber dam.
2. Describe the purpose of the rubber dam armamentarium (rubber dam, rubber dam clamp, punch, etc.).
3. Summarize the steps for placement and removal of the rubber dam.
4. Describe or define the key words and phrases found in the text or in the lecture.

G. Unit VII. Pit and Fissure Sealants

1. List the necessary armamentarium
2. Discuss the purpose, 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.
6. Explain the importance of recall visits for sealant maintenance.
7. Summarize how to explain to a parent the need for sealants on a child patient. Provide rationale, procedure, time involved, and prognosis.
8. Discuss the occlusal adjustment procedure after placing sealants.
9. Describe or define the key words and phrases found in the text or in lecture.

H. Unit VIII. Amalgam and Direct Metallic Restorative Materials

1. Differentiate between an amalgam alloy and a dental amalgam.
2. Discuss the composition of conventional and high-copper dental amalgams.
3. Describe the function (effects) of the major elements of a dental amalgam.
4. Discuss the self-sealing property of amalgam.
5. Describe the effect of moisture contamination on amalgam.
6. Discuss the factors that affect the manipulation and performance of amalgam.
7. Discuss acceptable mercury hygiene practices.
8. Describe the use and advantages of direct gold restorations.
9. Describe or define the key words and phrases found in the text or in the lecture.

I. Unit IX. Dental Implants

1. List indications and contraindications for dental implants
2. Describe the materials used for dental implants.
3. Recall the types and uses of dental implants
4. Discuss the dental hygienist’s role in the maintenance of dental implants
5. Describe or define the key words and phrases found in the text or in the lecture.

J. Unit X. Infection Control and Safety in the Dental Office and Dental Laboratory

1. Be cognizant of emerging diseases and the precautions necessary for their prevention.
2. Discuss the practice of standard precautions in dentistry.
3. Identify the types of personal protective equipment (PPE) that must be used for the practice of dentistry in the operatory and laboratory.
4. Explain the criteria for selection of PPE during dental procedures.
5. Determine the methods of sterilization or disinfection that can be used to decontaminate each type of instrument or item in the dental operatory or laboratory.
6. Evaluate surface disinfectants that may be used in the dental laboratory.

7. Describe effective ways to manage contamination caused by aerosols and splatter.
8. Review the policy “How to Handle Emergencies in the EPCC Dental Hygiene Program”.
9. Discuss the EPCC office exposure control plan and protocol for managing exposure to blood-borne pathogens.
10. Describe the infectious, physical, and chemical hazards in the dental office and laboratory.
11. Recognize and practice office and laboratory housekeeping practices that contribute to infection control and safety.
12. Describe an effective infection control protocol for handling impressions and dental appliances that are transferred between the following:
 - Dental operator and the dental laboratory within the dental office
 - Dental operator and an outside commercial laboratory
13. Discuss and demonstrate the procedure for disinfecting dental impressions.
14. Explain and demonstrate the procedure for disinfecting dentures and other dental appliances after they have been cleaned, processed or adjusted.
15. Describe and apply the infection control protocol that must be followed when grinding or polishing dentures and other appliances.
16. Review the preferred method (or methods) of sterilizing or disinfecting instruments or items used during manipulation of dental materials and prostheses.
17. Describe or define the key words and phrases found in the text or in the lecture.

K. Unit XI. 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 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.

L. Unit XII. Impression Materials and Taking an Alginate Impression

1. Differentiate between a model, a cast, and a die.
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. List the necessary armamentarium for alginate impressions.
 11. Explain proper tray preparation and correct manipulation of alginate impression material.
 12. Describe proper placement and removal of tray.
 13. Explain the usage of wax preparation on impression trays for alginate impressions.
 14. Explain proper storage and disinfection of alginate impression material.
 15. Describe or define the key words and phrases found in the text or in the lecture.

M. Unit XIII. Materials for 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.
6. Describe or define the key words and phrases found in the text or in the lecture.

N. Unit XIV. Removable Prosthesis 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 relines a denture.
6. Describe or define the key words and phrases found in the text or in the lecture.

O. Unit XV. Gypsum Materials used in Fabrication and Trimming of Study Models

1. Define study model, cast, and die.
2. Discuss the major differences between dental plaster, stone, and improved stone.
3. Explain the meaning of initial and final setting times.
4. List three examples of how to increase and decrease the setting times of gypsum products.
5. Discuss wet and dry strength as it relates to gypsum products.
6. Discuss the recommended techniques for the use of gypsum products in relation to measuring, mixing and pouring an impression.
7. Differentiate between the two methods of diagnostic cast/study model fabrication.
8. Identify preparation procedures for pouring and trimming study models.
9. Explain the laboratory safety procedures and necessary equipment for use in the laboratory mandated by the Occupational Safety and Health Administration.
10. List the steps for pouring a model for both a single and double pour and boxing wax technique.
11. List the steps in trimming a study model.
12. Evaluate the study model for acceptable cuts.
13. Describe or define the key words and phrases found in the text or in the lecture.

P. Unit XVI. 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.

Q. Unit XVII. Radiographic Appearance of Dental Tissues and Materials

1. Discuss the rationale for integrating radiology and dental materials.
2. Identify various dental tissues, materials, and dental implants on a radiograph.
3. Explain why, radiographically, dental tissues and materials appear radiopaque or radiolucent.
4. Integrate the radiographic appearance of dental tissues and materials with clinical information to assess the patient's status of health or disease.
5. Describe or define the key words and phrases found in the text or in the lecture.

R. Unit XVIII. 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.

S. Unit XIX. Tooth Whitening

1. Define tooth bleaching and explain the difference between vital and nonvital tooth bleaching.
2. Discuss the difference between intrinsic and extrinsic stain 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 and identify what the ADA states on the safety and efficacy of tooth whitening.
6. Discuss measures to prevent or alleviate tooth whitening side effects.
7. Discuss indications and contraindications for use of patient-applied, professionally

- supervised whitening technique.
8. Discuss indications and contraindications for professionally applied power whitening techniques.
 9. Outline the steps in the clinical phase of patient-applied, professionally supervised vital whitening technique.
 10. Discuss home care instructions for the patient using professionally supervised, self-applied technique.
 11. Describe the steps in construction of the whitening tray and identify the equipment and materials used.
 12. Describe the steps in the professionally applied power whitening technique and identify materials and equipment used.
 13. Describe or define the key words and phrases found in the text or in the lecture.

T. Unit XIX. 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.

SIMULATED LABORATORY ASSIGNMENTS

A. Laboratory Assignments consists of the following topics:

- Infection Control and Safety in Dental Laboratory
- Application of Pit and Fissure Dental Sealant materials
- Taking Alginate Impressions
- Fabricating and Trimming of Study Models
- Tray set up for various procedures
- Case studies
- Create lists for required armamentariums of procedures

B. Students simulate by using typodonts and dental stands equipment.

C. Peer and instructors evaluate preparation, technique, and outcome using standardized forms.

III. THECB Learning Outcomes (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

A. Course 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.

If the final numerical number for the course is .5 or higher the number will be rounded up to the next number.

B. Course Weights

Theory = 60% of final grade

Laboratory = 40% of final grade

C. Remediation

Assistance for individual remediation must be arranged through the Instructor of Record.

V. 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).

VI. 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.

VII. 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.

VIII. Dental Hygiene Entry-Level Competencies

- C.4 Use evidence-based decision making to evaluate emerging technology and treatment modalities to integrate into patient dental hygiene care plans to achieve high-quality, cost-effective care.
- C.5 Assume responsibility for professional actions and care based on accepted scientific theories, research, and the accepted standard of care.
- C.7 Integrate accepted scientific theories and research into educational, preventive, and therapeutic oral health services