DA A120: DENTAL MATERIALS

Item	Value
Curriculum Committee Approval Date	02/12/2025
Top Code	124010 - Dental Assistant
Units	2.5 Total Units
Hours	81 Total Hours (Lecture Hours 27; Lab Hours 54)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	Yes
Basic Skills	Not Basic Skills (N)
Repeatable	No
Open Entry/Open Exit	No
Grading Policy	Standard Letter (S)

Course Description

A comprehensive study of materials, including composition and characteristics. Emphasis on use of restorative dental materials and gypsum products. Lab exercises include manipulation of materials, taking impressions, pouring casts and trimming models. Construction of acrylic and metal temporaries and bleaching trays. COREQUISITE: DA A110. Transfer Credit: CSU.

Course Level Student Learning Outcome(s)

1. Define and differentiate the characteristics and properties of restorative materials and demonstrate the manipulation process of those materials.
2. Compare and manipulate the various types of dental cements, including permanent and temporary materials used in general dentistry.
3. Discuss and describe impression materials, mixing techniques their uses and applications.

Course Objectives

- 1. Discuss physical and biological properties of dental materials and their environment.
- 2. List the classifications of restorative materials.
- 3. Describe and explain all the structures and properties of dental materials including, stress, strain, ductility malleability, thermal adhesion and color.
- 4. Define and compare dental plaster and dental stone and give classifications of gypsum products.
- 5. Give the setting time and explain setting expansion of plaster and stone.
- 6. Understand strength, proportioning and mixing of plaster and dental stone.
- 7. Understand the care of gypsum products, dies and casts.
- 8. Discuss impression compounds and classifications of impression materials.
- 9. Explain thermal conductivity and flow distortion.
- 10. Describe and list impression pastes and their properties.
- 11. Define and understand irreversible, reversible hydrocolloids, elastomeric impression materials and demonstrate correct manipulation.
- 12. Define and compare synthetic resins and explain the manipulation, working and setting times.
- 13. Discuss the steps in finishing a synthetic resin restoration.
- 14. Discuss and understand the procedures and fabrication of a custom acrylic resin crown.
- 15. Understand the procedure to construct a denture base.
- 16. Compare and define restorative materials including aesthetic restorations.
- 17. Explain the steps for acid etching and bonding for aesthetic materials.
- 18. Discuss the science of metal alloy and understand their physical properties.
- 19. Discuss the types of corrosion of the dental restoration and the clinical significance of galvanic currents.
- 20. Define dental amalgam and its composition, setting times and different manufacturers.
- 21. Understand amalgams physical properties including dimensional change, strength and manipulation.
- 22. Explain the proportioning of alloy and mercury and explain mercury?s function.
- 23. Describe trituration and the proper consistency of the amalgam mix.
- 24. Discuss condensation and the effects of moisture.
- 25. Understand finishing and polishing of amalgams.
- 26. Define and discuss the uses of dental waxes which include inlay, baseplate, impression, sticky and boxing.
- 27. Discuss and demonstrate understanding of dental cements and their uses: including permanent and temporary cements.
- 28. Describe and relate the different cements in terms of mechanical adhesion to the tooth, composition, setting reaction, manipulation, and biocompatibility.
- 29. Discuss and understand the reasons why one type of luting cement cannot be used for all cast restorations.
- 30. Explain and discuss the armamentarium, steps and infection control procedures in taking an alginate upper and lower impression on a student partner.Pour and trim models
- 31. Understand and explain the steps and construction of a bleaching tray.
- 32. Discuss and understand OHSA- MSDS sheets along with its labeling precautions and training for staff.
- 33. Demonstrate the application and activation of bleaching agents using a non laser light-curing device.
- 34. Discuss and demonstrate the curing of restorative materials in an operative site with a light- curing device.

Lecture Content

Introduction The Dental Materials Course Historical Developments American Dental Association Specifications Dental Materials and the Oral Environment Physical Considerations Biting forces Temperature changes Acidity Biological Considerations Microleakage Temperature effects Galvanism Toxic effect of materials Classification of Restorative Materials Permanent restorations Temporary restorations Intermediary bases, liners, varnishes Structures and Properties of Dental Materials Stress and Strain Force Stress Strain Elasticity Ultimate strength Ductility and Malleability Flow Hardness Distortion Thermal Thermal conductivity Thermal expansion Adhesion Viscosity Wetting Film thickness Surface

tension Adhesion and tooth structure Color Dimensions of color Plaster and Dental Stone Dental Plaster The manufacture of plaster Setting of hemihydrate Water powder ratio Setting Time and Setting Expansion Control of setting time Control of setting expansion Strength, proportioning, mixing Classification of Gypsum Products Impression Plasters Type I Model plaster Type II Dental stone Types III and IV Care of Gypsum Products, Dies and Casts Impression Compound Introduction to Impression Materials Classification of Impression Materials Elastic materials: rubber base Aqueous elastomeric materials irreversible hydrocolloid (alginate) reversible hydrocolloid (agar) Silicone materials polyvinylsiloxane Thermal Conductivity, Flow Distortion Zinc Oxide Eugenol Impression Pastes Impression Pastes Composition Setting time Fluidity and consistency Dimensional stability Mixing technique Various methods of delivery Other Types of Pastes Noneugenol pastes/silicones Wax Impressions Materials: Reversible Hydrocolloids Hydrocolloids Reversible Hydrocolloid Irreversible Hydrocolloid Gel Strength Dimension stability Dental Hydrocolloids Reversible type Composition Preparation of materials Conditioning The impression The tray styles sizing Wet field technique Dimensional stability Causes of common difficulties Impression Materials: Irreversible Hydrocolloid Alginate Composition Shelf life Manipulations Gelation time Mixing Dimensional stability Construction of the die Common difficulties Elastomeric Impression Materials Polysulfide Rubber Polyether Rubber Polyvinylsiloxane Technical Co nsiderations and Manipulation of Rubber Impression Materials Shelf life Techniques The tray styles sizes custom trays Adhesion to the tray Spatulation/ extruder Manipulation, working and setting times Dimensional stability The die Causes of common difficulties Synthetic Resins Polymerization/ monomer polymer Manipulation, working and setting times Finishing Fabrication of a Custom Acrylic Resin and Metal Temporary Crowns Characteristics/Advantages Armamentarium needed Procedure for Fabrication direct indirect Finishing, polishing Denture Base and Custom Tray Materials Classification of resins Restorative Materials Aesthetic Restorations Composites Microfilled Macrofilled Hybride Acid Etching/bonding Cure restorative or orthodontic materials in operative site with a light-cure device Science of Metals: Alloys Types of Alloys Physical properties of Solid Solution Alloys Heat treatment Control of physical properties Strain hardening Alloying Heat treatment Corrosion Types of Corrosion The Dental Restoration Clinical Significance of Galvanic Currents Dental Amalgam The Amalgam Restoration Composition Manufacture Setting Reactions Physical Properties of Amalgam Dimensional change Strength Manipulation Proportioning the Alloy and Mercury The Function of Mercury Toxicity Effects on properties Trituration Mechanical amalgamates Consistency of mix Condensation Effect of Moisture Finishing and Polishing Dental Waxes Inlay Wax Baseplate Wax Impression Wax Impression tray and stick Composition Sticky Wax Boxing Wax Other Waxes Dental Cements for Luting Classification of the Dental Cements Zinc Phosphate Cement Composition Setting time Adhesion Strength Manipulation Improved Zinc Oxide Eugenol Cement Polycarboxylate Cements Glass Ionomer Cement Zince phosphate Cements for Restorations, Cavity Varnishes, Liners and Bases Glass Ionomer Cement Temporary Restorations Intermediate Restorations Cavity Varnishes, Liners and Bases Alginate Impressions/Bite Registrations on Fellow Students Tray Selection/size Adhesion Loading Placing/removing Care prior to pouring Use of cross contamination protection techniques Construction of bleaching trays Apply and activate bleaching agents using a non- laser light curing device Cal-DOSH Material Safety Data Sheets (MSDS) Labeling Precautions for staff Staff training

Lab Content

I. Mixing dental plaster a. pouring rubber molds II. Mix amalgam capusules a. condense into blue tooth. b. manipulate c. carve d. disposalIII. Mix composite materials a. etching and bonding sysytemIV. Impressions a. full lower and upper alginate b. pouring up of modelsV. Marking and measuring for model trimming. a. Trimming of study modelsVI. Elastomeric impression materials a. quadrant impression b. pour up in stone c. polyvinylsiloxane bite registrationVII. Waxes a. wax bite registrationVIII. Alginate a. impressions on typodont b. impression on student partnerIX. Bleaching trays a. vacu-form for student partner b. products and procedure, patient instructionX. Varnish, liners and bases a. mix, manipulate and apply to blue typodont tooth XI. Cements a. glass ionomer, zinc oxide eugonel, zinc phosphate, polycarboxylate. b. mixing of cements into a a luting consistency and temporary consistency.XII. Fabrication of temporary custom acrylic crownXIII. Intermediate class II temporary filling.

Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)
- Lab (04)
- DE Live Online Lab (04S)

Instructional Techniques

1. Assignments a. Lecture/Discussions b. Reading Assignments c. Laboratory demonstrations and weekly lab assignments d. Criterion based testing e. Reading assignments f. Selected videos, slides, digital media, and overheads for demonstration and exercises

Reading Assignments

Textbook reading assignments and student workbook assigned chapter study

Writing Assignments

1. A portion of the exams and quizzes include short answer fill-in to a maximum of one paragraph/question. 2. Completion of reports which include chemical properties, manipulations, and advantages and disadvantages of different dental materials. 3. Proficiency demonstrations include several evaluated practicum applications where students must demonstrate laboratory skills (see student evaluation section).

Out-of-class Assignments

HW assignments in student workbook. Review for tests and lab skill competencies

Demonstration of Critical Thinking

1. Methods a. Written quizzes, midterms and final (written and practical) examinations b. Laboratory projects and specific requirements2. Standards a. 75% of the points possible for a grade of "C" to be considered passing the course b. Stated standards of performance on all designated critical objectives3. A mastery level 75% of theory and laboratory must be achieved in order to pass course with minimum grade of C. The grading scale is: 4. A 50% lecture and 50% laboratory grade will be combined. A passing grade of C must be achieved in both laboratory and lecture.

Required Writing, Problem Solving, Skills Demonstration

1. A portion of the exams and quizzes include fill-in short answer and multiple choice. 2. Proficiency demonstrations include several evaluated practicum applications where students must demonstrate laboratory skills (see student evaluation section).

Eligible Disciplines

Dental technology (dental assisting, dental hygiene): Any bachelor's degree and two years of professional experience, or any associate degree and six years of professional experience. Dental technology (dental assisting, dental hygiene): Any bachelor's degree and two years of professional experience, or any associate degree and six years of professional experience.

Textbooks Resources

1. Required Bird, Robinson.. Modern Dental Assisting, Student Workbook, latest ed. New York: Elsevier Saunders, 2024 2. Required Bird,Robinson. Modern Dental Assisting, Student Workbook, latest ed. New York: Elsevier Saunders, 2024 3. Required Bartolomucci Boyd, Linda., . Dental Instruments A Pocket Guide, latest ed. St. Louis, Missouri: Elsevier Saunders, 2024