

SYLLABUS

COURSE: DHCT 3307 / DHBS 4307 Dental Materials
SEMESTER: Fall
CREDIT HOURS: 3.0

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COURSE DIRECTORS: Harold A. Henson, R.D.H., M.Ed.
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GOAL

The goal of this course is to acquaint the dental hygiene student with the composition, properties and manipulation of dental materials with a primary emphasis on those materials used in the dental office and a secondary emphasis on selected materials used in the dental laboratory.

Lectures, reading assignments and laboratory projects will provide a basic understanding of dental materials used in the dental office and an overview of selected materials used in the dental laboratory. This information permits the student to interpret the use of dental materials in clinical practice and to communicate on the use of materials with the dentist, dental assistant and patient. This course also provides a scientific background for the selection and use of dental materials.

OBJECTIVES

Given lectures, handouts, slide presentations, videotapes, and laboratory experiences, the student will be able to perform the following with 75% accuracy:

I. INTRODUCTION TO DENTAL MATERIALS

1. State the main aim of restorative dentistry that relates to the use of dental materials.
2. State two main reasons why a composite might be used to restore a small portion of an anterior tooth.
3. State the reason to use an amalgam rather than a composite to restore a portion of a posterior tooth subject to high biting forces.
4. State the main purpose of a cement base placed beneath a metallic posterior restoration in a deep cavity.
5. State the major reason for the selection of a cast gold crown when most or all of the coronal enamel of a posterior tooth must be replaced.
6. State two reasons for the selection of a dental porcelain to restore the crown of an anterior tooth.
7. List three advantages of porcelain-fused-to-metal crowns for use in the anterior portion of the mouth.
8. List three desirable properties of gold and nickel-chromium alloys used for dental bridges.
9. Describe the use of a removable partial denture, and list two materials that are used in its fabrication.
10. Give the use of a complete denture, and identify the materials used to make the base and the teeth.

II. PROPERTIES OF DENTAL MATERIALS

1. Describe the purpose of ANSI/ADA specifications.
2. Give two types of dimensional changes caused by physical or chemical changes and cite a dental material as an example of each.
3. Describe the clinical importance of the coefficient of thermal expansion, and rank the values of various dental materials.
4. State two reasons why percolation is undesirable and relate it to the coefficient of thermal expansion.
5. Describe the clinical importance of thermal conductivity, and give two examples in restorative dentistry.
6. Describe the clinical importance of galvanism, and give an example of it in restorative dentistry.

7. Indicate two conditions that can lead to corrosion of dental amalgam, and describe tarnish.
8. Give examples of solubility, adsorption, and absorption in dentistry.
9. Give examples of wettability of dentistry, describe how it is measured, and indicate the effect of a detergent on wettability.
10. Compare average values of biting forces that occur with molars and incisors in the mouth.
11. Compare the forces in pounds exerted by natural dentition versus bridges and dentures.
12. Define stress and relate it to force and area.
13. Draw schematic representations of compressive, tensile and shear stresses.
14. Define strain, and compare the strain of rubber impression materials and gold alloys.
15. Describe yield and ultimate strength in dentistry, and compare the tensile and compressive strengths of dentin, enamel, amalgam, and composites.
16. Describe elongation, and state how ductility and brittleness relate to it.
17. Describe hardness, and compare the Knoop hardness of enamel, dentin, cementum, porcelain, and unfilled acrylic plastic.
18. Describe elastic, viscoelastic and viscous strains as they apply to a rubber impression material. State the effect of a "snap" removal on the strength of an alginate impression.

III. CLINICAL DETECTION AND CARE OF RESTORATIVE MATERIALS

1. Differentiate between porcelain and composite material.
2. Describe common procedures routinely performed by a dental hygienist that could be detrimental to teeth and restorative materials.
3. Recall the recommended instrumentation technique around the margins of cast restorations.
4. Explain the causes of possible damage to restorations from the use of high-speed instrumentation.

IV. PIT AND FISSURE SEALANTS

1. Indicate the functions of monomer, filler and activator in amine-accelerated and visible light-accelerated sealants.
2. Describe the retention of a sealant, and state four ways by which acid etching improves retention.
3. Describe the effectiveness of sealants in first permanent molars and second primary molars in children ages 5-9 years in terms of time and retention.
4. List four situations in which sealants should not be used.
5. Describe what happens to dental caries left beneath a sealed fissure.

6. List and describe six basic steps involved in the application of a visible light-accelerated sealant. Give precautions for each step.
7. Select and mount appropriate extracted teeth for several laboratory projects.
8. Properly place self- and light-cured sealants in extracted teeth.

V. DENTAL AMALGAM AND MERCURY

1. Describe the safety of mercury in amalgam from the perspective of a patient.
2. Cite the most significant factor that can cause high levels of mercury vapor in air in the dental office.
3. List six of 12 ADA recommended procedures for the handling of mercury.
4. List the components, write the simplified reaction of mercury with high-copper amalgam alloy and indicate what phenomena causes amalgam to harden.
5. Identify the phases in amalgam associated with the Greek symbols γ , γ_1 , and γ_2 , and indicate which phase is weakest and most susceptible to corrosion.
6. Explain why that very little free mercury is associated with a completed amalgam restoration.
7. Describe the clinical importance of excessive dimensional change, low strength, excessive creep, and undesirable tarnish and corrosion. Compare tensile and compressive strengths of amalgam.
8. Describe the most common packaging of amalgam and list its two advantages.
9. Explain why the mercury-alloy ratio is a unique characteristic of an amalgam alloy - include three factors.
10. List three factors that control the quality of an amalgam mass during trituration. State which factor is easiest to control.
11. Identify the appearance of overmixed and undermixed amalgam, and describe the effects of overmixing and undermixing on the properties and clinical handling of amalgam.
12. List the three objectives of condensation of amalgam, and compare variables of condensation for admixed and spherical amalgams (see handout).
13. Describe the effects of delayed condensation and excess mercury on the properties of amalgam.
14. Compare manipulative variables for admixed and spherical amalgams (see handout).
15. List a typical finishing and polishing sequence for high-copper amalgams. Indicate a precaution for burnishing. Indicate when finishing and polishing can be done for typical amalgams.
16. Indicate three clinical benefits of a well-polished amalgam.
17. Mix encapsulated dental amalgam in the laboratory.

18. Place and condense amalgam into prepared Class I and Class II preparations in extracted teeth in the laboratory.
19. Carve appropriate anatomy in the aforementioned amalgams.

VI. ALGINATE AND AGAR IMPRESSION MATERIALS

1. Cite examples of rigid and flexible impression materials, and state the clinical importance of the distinction.
2. State the use of dental impression compound, and state how the term thermoplastic applies to this material.
3. State the use of zinc oxide-eugenol impression material.
4. State the uses and advantages of agar impression material, and state how the terms reversible, hysteresis and hydrocolloid apply to this material.
5. Describe the manipulation of agar impression material.
6. List five advantages of alginate impression material.
7. List seven components in alginate, and state the function of each.
8. Describe two packaging containers of alginate.
9. Write the setting reaction of alginate in words, and state how the term irreversible hydrocolloid applies to alginate.
10. State the typical setting time for an alginate, and discuss factors that influence this property.
11. Discuss the clinical importance of the following properties of alginate:
 - 11.1 permanent deformation
 - 11.2 flexibility
 - 11.3 tear strength
 - 11.4 dimensional stability and syneresis
 - 11.5 reproduction of detail
12. Discuss the following steps for the manipulation of alginate:
 - 12.1 dispensing and mixing
 - 12.2 loading the tray
 - 12.3 making the impression
 - 12.4 removing the impression
 - 12.5 preparing the impression for a model material
 - 12.6 storing the impression
 - 12.7 disinfection
13. Describe the agar/alginate impression technique.
14. Make maxillary and mandibular impressions of a patient.

VII. RUBBER IMPRESSION MATERIALS

1. Describe the composition of addition silicone impression material, and state a by-product that may be formed.
2. State the importance of by-product formation of polysulfides and condensation silicones on accuracy.
3. Compare qualitatively the following properties of addition silicones with those of polysulfides and polyethers:
 - 3.1 working and setting times
 - 3.2 shrinkage on setting
 - 3.3 permanent deformation
 - 3.4 flexibility
 - 3.5 wettability by gypsum
4. State the consistencies of the addition silicones and compare their uses.
5. State the major advantage of automatic mixing of addition silicones.
6. State two disadvantages of the polyethers.
7. Describe the composition of polyether impression material.
8. Describe the effect of water on the polyethers.
9. State major disadvantages of the polysulfide and condensation silicone impression materials.
10. State environmental factors that affect the setting time of rubber impression materials, and state the effect of latex gloves on the setting of addition silicone putties.
11. State a precaution when using a tray adhesive.
12. Describe the disinfection of rubber impressions.
13. Mix a rubber impression material.
14. Load the rubber impression material into a syringe and tray.
15. Obtain an impression of a gypsum model in the laboratory.

VIII. MODEL AND DIE MATERIALS

1. Describe the relationship between a model and an impression. State why flaws in the impression should be minimal.
2. Define model, die and cast.
3. List three types of gypsum, and give a dental application of each.
4. Describe the chemical and physical differences among the three types of gypsum. State how these differences affect manipulation.
5. Briefly discuss how gypsum hardens.

6. Describe why excess water is needed to mix gypsum and why its amount varies among the three types of gypsum.
7. Describe how to detect the initial setting time of gypsum.
8. Describe the effect of density of the set gypsum mass on its strength. Compare dry strength to wet strength and how they relate to maximum hardness and abrasion resistance.
9. Compare the dimensional changes of the three types of gypsum on setting, and describe the accuracy of high-strength stone dies.
10. Describe hygroscopic expansion and compare it to normal expansion.
11. Define water-powder ratio, and cite commonly used values for the three types of gypsum.
12. State why gypsum powder should be added to water in the mixing sequence.
13. Describe the effects of increased spatulation on setting time and dimensional change, and state how vacuum mixing affects these properties.
14. Cite the importance of vacuum spatulation and vibration.
15. Give examples of an accelerator and retarder for gypsum.
16. Describe why an impression must be rinsed before the model is poured.
17. Describe three methods for the construction of a gypsum model from an alginate impression.
18. State the precautions associated with a silverplating solution.
19. Prepare and trim acceptable maxillary and mandibular gypsum models.

IX. FINISHING, POLISHING, AND CLEANSING MATERIALS

1. Describe abrasion. State why an abrasive sequence should be followed.
2. Describe three factors that influence the rate of abrasion, and state which of these is most easily varied clinically.
3. Distinguish among particle hardness and size for finishing, polishing and cleansing abrasives, and state the purpose of each of these techniques.
4. List four examples of typical finishing and polishing agents.
5. Describe and compare the finishing and polishing of fine-particle and microfilled composites.
6. Indicate two precautions that should be observed in polishing an acrylic denture with plastic teeth. List two results of overheating.
7. Indicate a precaution that should be observed in polishing a gold restoration.
8. Indicate two results of excessive wear during a prophylactic procedure, and list materials that are susceptible to damage.
9. Compare the abrasion of enamel and dentin by abrasives used in prophylactic pastes.

10. State the clinical results of using a fluoride-containing prophylactic paste.
11. List three major ingredients in a dentifrice, and state their function. State three effects of an ideal abrasive.
12. State precautions that patients with exposed dentin or cementum or with certain restorations should follow with respect to the use of a dentifrice.
13. Compare the abrasion of toothpastes and toothbrush bristles. State guidelines to follow in selecting a toothbrush and dentifrice.
14. State an effective means of cleansing a denture. State disadvantages of alkaline perborate and alkaline hypochlorite denture cleansers.
15. List several precautions associated with cleaning an acrylic or metal denture.
16. Describe a technique for cleaning a denture with a soft liner.

X. DIRECT ESTHETIC RESTORATIVE MATERIALS

1. Describe the five major components in a composite, and indicate their function. State the two phases of a composite.
2. Indicate the primary differences among microfine, fine-particle and blended composites.
3. Indicate two methods by which polymerization of composites is accelerated.
4. Describe the clinical importance and compare the following properties for fine-particle and microfilled composites.
 - 4.1 polymerization shrinkage
 - 4.2 thermal conductivity and expansion
 - 4.3 water sorption
 - 4.4 radiopacity
 - 4.5 compressive strength and hardness
5. Compare the bond strengths of composite to acid-etched enamel and dentin.
6. Describe the bonding mechanism between a dentin bonding agent and dentin.
7. State two steps necessary to insure adequate bonding of composite to tooth structure.
8. State how polishing is influenced by particle size of the composite.
9. Describe the dispensing, mixing and insertion of a two-paste and single-paste composites. Explain why microfilled composites require more light exposure to cure than fine-particle composites.
10. Describe recommended pulpal protection under a composite, and indicate why zinc oxide-eugenol cements are not indicated.
11. Describe the composition and setting of glass ionomer restorative materials.
12. Describe four noteworthy properties of glass ionomer restorative materials.
13. Compare the retention of ionomers and composites in areas of cervical erosion.

XI. PROSTHETIC PLASTICS

1. List four uses of acrylic plastics in dentistry.
2. Define polymerization, monomer and polymer.
3. State the effect of excessively high temperatures during polymerization of an acrylic denture.
4. Describe the clinical importance of the following properties of an acrylic denture:
 - 4.1 thermal conductivity
 - 4.2 polymerization shrinkage
 - 4.3 water sorption
 - 4.4 solubility
5. State four precautions for patients involving the care of dentures.
6. State the uses of soft liners and treatment materials.
7. Describe three disadvantages of silicone liners.
8. State why home reliners for dentures should be discouraged.
9. List three factors that affect the retention of a denture.
10. Compare the properties of porcelain and plastic teeth for dentures.
11. Fabricate a self-cured acrylic custom impression tray.

XII. DENTAL CEMENTS

1. List 5 primary uses of cements, and cite an example of a cement suitable for each use.
2. List the ingredients found in zinc phosphate cement.
3. Describe the manipulation of zinc phosphate cement, and state the effects of the following manipulative variables on its strength, solubility and setting time:
 - 3.1 decreased powder-liquid ratio
 - 3.2 increased mixing temperature
 - 3.3 water contamination
4. Describe why it is desirable to minimize the temperature rise during mixing of zinc phosphate cement.
5. Rank the strengths of the following cements: zinc phosphate, EBA-alumina ZOE, zinc polycarboxylate, and glass ionomer.
6. Name the ingredients in ZOE cement, and name ingredients added to it to improve its strength.
7. Describe the manipulation of ZOE cement, and cite two environmental factors that influence the setting reaction.
8. Describe pulpal protection required for zinc phosphate, ZOE, zinc polycarboxylate, and glass ionomer cements.

9. Describe the mechanisms of bonding of zinc phosphate, ZOE, zinc polycarboxylate, and glass ionomer cements to dentin.
10. Name the ingredients in zinc polycarboxylate cement.
11. Name the ingredients in glass ionomer cement.
12. Describe the manipulation of zinc polycarboxylate and glass ionomer cements.
13. Characterize the end of working time of zinc polycarboxylate and glass ionomer cements.
14. Describe and give examples of cements used for:
 - 14.1 high-strength bases
 - 14.2 temporary fillings
 - 14.3 low-strength bases
15. Describe the uses and composition of:
 - 15.1 cavity liners
 - 15.2 varnishes
16. Describe the following special applications of cement:
 - 16.1 root canal sealer
 - 16.2 gingival tissue pack and periodontal dressing
 - 16.3 cementation of orthodontic bands
 - 16.4 direct bonding of orthodontic brackets
 - 16.5 cementation of ceramic and resin veneers and inlays.
17. Mix a zinc phosphate cement and one other cement.

XIII. GOLD ALLOYS AND DENTAL CASTINGS

1. Define karat and fineness of gold alloys.
2. State the uses of Type I, II, III and IV gold alloys.
3. State the role of the following ingredients in a gold alloy:
 - 3.1 gold
 - 3.2 copper and silver
 - 3.3 platinum group metals
4. State the range of gold content found in low-karat and white gold alloys.
5. State the uses of gold and silver solders.
6. Name the four types of alloys used for bonding to porcelain.
7. Compare the ease of fabrication and cost of the four types of alloys used for bonding to porcelain.
8. Name the alloy used for fabrication of most partial dentures, and state two reasons why it has replaced gold alloys.
9. List a six-step sequence used to cast a gold inlay.

10. Describe two reasons why the wax pattern is a potential source of inaccuracy in dental casting.
11. Define sprue, and state where it should be attached to a pattern.
12. State the purposes of a casting investment, and list two types of casting investment.
13. Describe the shrinkage and expansion of materials used in a casting technique.
14. State how a gold alloy is melted and forced into the mold.
15. Define pickling and state how to avoid contamination of the casting during this process.

XIV. MOUTH PROTECTORS AND CUSTOM TRAYS

1. Give the percentage of oral injuries sustained in contact sports.
2. Give the percentage of oral injuries sustained in football that are prevented by extraoral protectors.
3. List four prevalent causes of dental injury in football in the presence of a face guard and list the injuries most frequently observed.
4. Indicate athletic programs in which athletes are required to wear mouth protectors.
5. List three types of mouth protectors and describe the material commonly used in custom-made protectors.
6. List five advantages of custom-made protectors.
7. Discuss the clinical implications of hardness and staining.
8. Describe three causes of the breakdown of a mouth protector.
9. List two causes of permanent deformation of a mouth protector and indicate two proper methods of storage.
10. Describe the need for continuous evaluation of deterioration of a mouth protector.
11. Describe the four basic steps to prepare a custom-made mouth protector from a thermoplastic material.
12. Indicate two goals of forming a mouth protector.
13. Indicate why a vacuum-formed mouth protector is more desirable than one formed by hand.
14. Describe a procedure to adjust a mouth protector to equalize the occlusion.
15. Give two mistakes common to the fabrication of mouth protectors.
16. List five instructions that should be given to the patient for the proper care of a mouth protector.
17. Fabricate a mouth protector on a gypsum cast.

XV. DENTAL BLEACHING

1. List dental and medical contraindications for bleaching.
 - 1.1 extrinsic stains
 - 1.2 exposed root surfaces
 - 1.3 pregnancy
 - 1.4 heavily restored
 - 1.5 allergies, sensitivities
2. List implications for bleaching.
3. Explain the bleaching mechanism.
4. List possible side effects from bleaching and precautions or preventions of each.
 - 4.1 black hairy tongue
 - 4.2 hypersensitivity
 - 4.3 gingival irritation
 - 4.4 TMJ pain

XVI. TEMPORARY CROWNS

1. Describe the reasons for placing a temporary crown.
2. Describe the materials used to construct a temporary crown.
3. Describe a method to make a temporary crown with acrylic resin.

RESOURCES

I. Media Resources

A. Printed Media

1. Required Textbook

Gladwin, M., Bagby, M.
Clinical Aspects of Dental Materials: Theory, Practice and Cases, 3rd edition
Lippincott Williams & Wilkins, 2008.

2. Suggested Additional Resources

Wilkins, E.M.
Clinical Practice of the Dental Hygienist, 10th edition
Lippincott Williams & Wilkins, 2008.

3. Required Monograph

Laboratory Manual
Handouts Numbers 1 to 12

B. Non-printed Media

1. Videotapes

<i>Class I Occlusal and Buccal Pit Amalgam Restoration (7 min)</i>	# 604
<i>Preparation of Gypsum Casts (12 min)</i>	# 609
<i>Acrylic Tray for a Rubber Base Impression (18 min)</i>	# 571
<i>Rubber Base Impression and Gypsum Dies (10 min)</i>	# 590
<i>Mixing Glass Ionomer Cements (5 min)</i>	# 605
<i>Mixing Polycarboxylate Cements (5 min)</i>	# 606
<i>Mixing Zinc Oxide-Eugenol Cements (5 min)</i>	# 607
<i>Mixing Zinc Phosphate Cements (5 min)</i>	# 608

II. Human Resources

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Course Director

Magda Eldiwany, D.D.S., M.S.
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Laboratory Director

STUDY PLAN AND REQUIREMENTS

A. Attendance and punctuality

1. Attendance and punctuality are required at all sessions of the course.
2. Students must report emergencies to the Dental Hygiene secretary by calling 713-500-4086.
3. If for any reason you are unable to attend class, you must contact the Ms. Magee, Dental Hygiene secretary at 713-500-4086 and Mr. Henson at 713-500-4395 before your absence.
4. The student is responsible for obtaining information, materials, and assignments that were presented during a missed class.
5. Absences will affect your grade. Refer to the catalog or handbook for the attendance policy.

B. Reading assignments

1. Reading/video assignments should be completed before class/lab.
2. Additional required reading may be distributed during class/lab.

C. Academic success

1. The student is encouraged to review his/her course status regularly.
2. A student in academic difficulty in the course must contact the course director for assistance.

**DHBS 4307/DHCT 3307 DENTAL MATERIALS
2009 Fall Semester Lecture Schedule**

Lecture: Tuesdays, 10:00 am – 11:50 am; Room B14
Lab: 1 – 2:50 pm; Room B25

Date	Lecture/Lab Topics	Assignments
Aug 18	Introduction to Course, Materials Science and Dentistry Properties of Dental Materials	Gladwin and Bagby: Chs. 1, 2, 3
Aug 25	Infection Control, Clinical Detection and Care of Restorative Materials Class Presentations: Properties of Dental Materials Quiz 1 Study Material: Properties of Dental Materials and Material Science	Gladwin and Bagby: Chs. 14, 20, 21
Sep 1	Adhesion/Bonding Polymers and Polymerization Pit and Fissure Sealants Quiz 2 Study Material: Infection Control, Clinical Care of Restorative Materials	Gladwin and Bagby: Chs. 4, 25 Wilkins: Ch. 34
Sep 8	EXAM 1 Room 207 <i>Study Material: Properties of Dental Materials, Material Science, Infection Control, Clinical Care of Restorative Materials, Pit and Fissure Sealants</i>	
Sep15	Composites and Glass Ionomers Quiz 3 Study Material: Polymers and Polymerization, Pit and Fissure Sealants	Gladwin and Bagby: Ch. 5
Sep 22	Dental Cements and Bases Quiz 4 Study Material: Composites and Glass Ionomers	Gladwin and Bagby: Ch. 7
Sep 29	EXAM 2 Room 207 <i>Study Material: Polymers /Polymerization, Composites and Glass Ionomers, Dental Cements and Bases</i>	
Oct 6	Dental Amalgam and Mercury Quiz 5 Study Material: Dental Cements and Bases	Gladwin and Bagby: Ch. 6
Oct 13	Abrasives, Finishing and Polishing Quiz 6 Study Material: Dental Amalgam and Mercury	Gladwin and Bagby: Ch. 16

Date	Lecture/Lab Topics	Assignments
Oct 20	Characteristics of Impressions: Alginate and Agar, Model and Die Materials Quiz 7 Study Material: Abrasives, Finishing and Polishing	Gladwin and Bagby: Chs. 8, 9 Wilkins: Ch. 11
Oct 27	EXAM 3 Room 207 <i>Study Material: Dental Amalgam and Mercury, Abrasives, Alginate and Agar, Model and Die Materials</i>	
Nov 3	Mouth Protection and Custom Trays Quiz 8 Study Material: Alginate and Agar, Model and Die Materials	Gladwin and Bagby: Ch. 18
Nov 10	Tooth Whitening Quiz 9 Study Material: Mouth Protectors and Custom Trays	Gladwin and Bagby: Ch. 17
Nov 17	Debonding Orthodontic Resin, Gold and Non-precious Alloys, Dental Casting Quiz 10 Study Material: Tooth Whitening	Gladwin and Bagby: Chs. 6, 10, 32
Nov 24	Rubber Impression Materials	Gladwin and Bagby: Ch. 8
Dec 1	Review for Final Exam Case Studies DUE Online Course Evaluation	
Dec 9 9 – 11:00 am	COMPREHENSIVE FINAL EXAM Room 340	

EVALUATION METHODS

I. GRADE REQUIREMENTS:

Exam 1	15%
Exam 2	15%
Exam 3	15%
Final Exam	15%
Lab Exercises	30%
Quizzes	5%
Case Studies	5%
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Total	100%

II. GRADING SCALE:

A = 93 - 100

B = 84 - 92

C = 75 - 83

D = 70 - 74

F = 69 and below

III. OVERALL REQUIREMENTS:

- A. Exams, quizzes, case studies, and laboratory exercises must be completed.
- B. Grades below passing on exams must be discussed with the Course Director. Students must pass both the laboratory and lecture portions of the course with a 70 or higher to receive credit for the course.
- C. Make-up laboratories must be scheduled with the Laboratory Director. All labs must be completed with a passing grade to receive credit for the course.
- D. It is the responsibility of the student to review his/her performance with the Course Director within two days of receiving a non-passing score on an exam or laboratory exercise.
- E. An exam missed for a valid reason must be scheduled with the Course Director as soon as possible after the absence. Make-ups will be scheduled during the final exam period. **There will be no make-up for quizzes.** An exam missed for a non-valid reason will be scored as a zero.

DHBS 4307/DHCT 4307 DENTAL MATERIALS

Laboratory Manual

Magda S. Eldiwany, D.D.S., M.S.

DHBS 4307 / DHCT 3307 DENTAL MATERIALS Laboratory Manual

This manual contains 12 laboratory exercises. Printed on each exercise handout is an evaluation scale for laboratory performance.

LABORATORY EVALUATION

Four to six criteria relevant to laboratory performance will be evaluated for each laboratory exercise. The student's evaluation will be verified or modified by the instructor to determine the grade. Prior to faculty grading you will be required to assessment your performance on each lab session.

EVALUATION SCALE

The evaluation scale for **attendance, punctuality, professionalism and laboratory performance** will be as follows:

5 - Excellent	All evaluation criteria accomplished
4 - Good	All but one criteria accomplished
3 - Average	All but two criteria accomplished
2 - Poor*	All but three criteria accomplished
1 - Unsatisfactory*	Four or more criteria not accomplished

**Attendance You must attend and successfully complete all lab sessions.

**Punctuality You must be punctual for all lab sessions.

**Professionalism You must display professionalism for all lab sessions.

**Failing to meet any of the double asterisks criteria will result in a "1" for that lab session even if you have successfully completed the lab procedures. You will repeat that respective session on the remake lab session; please see lab schedule for specific date.

* and ** = The student will be required to repeat the laboratory.

GRADE MATRIX

Evaluation points = Lab grade

60 = 100	47 = 78
59 = 98	46 = 76
58 = 96	45 = 75
57 = 95	44 = 73
56 = 93	43 = 71
55 = 91	42 = 70
54 = 90	41 = 68
53 = 88	40 = 66
52 = 86	39 = 65
51 = 85	38 = 63
50 = 83	37 = 61
49 = 81	36 = 60
48 = 80	35 = 58

Faculty Lab Coordinator:

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***To calculate your grade not represented on the scale take your total number of lab points and divide by 60.**

**DHBS 4307/DHCT 3307 DENTAL MATERIALS
2009 Fall Laboratory Schedule**

Tuesday, 1:00 PM – 2:50 PM
Room B25, unless otherwise indicated

DATE	TOPIC	ASSIGNMENT	LOCATION
Aug 18	Sort and Mount Teeth/Bitewings for Pit and Fissure Sealants (A thru H) Pickup Dental Materials Cassettes and Handpiece Kit from Educational Support Services; Room 330	Handout 1	B25
Aug 25	Screening /Bitewings for Pit and Fissure Sealants (I thru Z)		DH Clinic
Sep 1	Pit and Fissure Sealants – Mounted Teeth	Handout 2	B25
Sep 8	Pit and Fissure Sealants – Student Partners		DH Clinic
Sep 15	Composite Pack and Polish	Handout 3	Sim Lab
Sep 22	Cements	Handout 4	B25
Sep 29	Cements	Handout 4	B25
Oct 6	Amalgam Condense – Class I	Handout 5	Sim Lab
Oct 13	Amalgam Condense – Class II	Handout 5B	B25
Oct 20	Amalgam Polish	Handout 6	B25
Oct 27	Alginate Impressions Group A: Clinician (Clinic and Lab) Group B: Patient	Handouts 7, 8 & 9	DH Clinic & B25
Nov 3	Alginate Impressions Group B: Clinician (Clinic and Lab) Group A: Patients	Handouts 7, 8, & 9	DH Clinic & B25
Nov 10	Model Trimming	Handout 10	B25/B54
Nov 17	Fabricating Bleaching Trays/Color Training Exercises	Handout 11	B25
Nov 24	Rubber/Silicone Impressions/ Temporary Crowns	Handouts 12A and 12B	B25
Dec 1	Remake – Lab Completion	Bring all lab handouts (stapled) to class for lab evaluation.	B25

DHBS 4307/DHCT 3307 DENTAL MATERIALS NAME _____
LABORATORY HANDOUT 1 – SORT AND MOUNT TEETH

OBJECTIVES: (1) to select appropriate natural extracted teeth to be used for future laboratory projects - pit and fissure sealants, (2) to use plastic teeth (purchased from Bookstore) for amalgam mixing, placement and polishing, composite placement and polish and (3) to mount these selected teeth in gypsum in an arrangement for easy use.

MATERIALS NEEDED: Numerous extracted teeth, typodont, plaster bowl and spatula, a plastic disposable cup, dental stone, and water. Purchase plastic teeth for typodont at the DB Bookstore.

PROCEDURE:

1. After an instructor has chosen the best specimens from your collection (4-6 natural extracted teeth with no decay or restorations molars and/or premolars), clean them of any calculus or soft tissue.
2. Mix a small amount of dental stone (one level scoop full of powder, 16 ml water for each cup). Fill the cup and place the selected teeth in the gypsum mix orienting them as instructed by faculty.
3. After the gypsum has hardened, write your last name and initials with a black marker on the side of the plastic cup. Hand in your work with this self-evaluation form completed.
4. Next take your typodont and replace the existing teeth with the restorative teeth using the enclosed typodont screwdriver.

Instructions: The instructor will make a check “✓” mark next to criteria accomplished and an "X" next to those not accomplished during the laboratory procedure.

- _____ All buccal or lingual surfaces face the same direction.
 _____ The cervical portion of the teeth are above the level of the stone.
 _____ The teeth are arranged with interproximal contact if possible.
 _____ Stone has a smooth appearance.
 _____ Last name and first initial written on the side of the cup.
 _____ Attendance _____ Punctuality _____ Professionalism

5 – Excellent	All evaluation criteria accomplished
4 – Good	All but one criteria accomplished
3 – Average	All but two criteria accomplished
2 – Poor	All but three criteria accomplished
1 – Unsatisfactory*	Four or more criteria not accomplished

* = The student will be required to repeat the laboratory.

Student Evaluation

Evaluation Points: _____
 Comments: _____

Student Signature: _____
 Date: _____

Faculty Evaluation

Evaluation Points: _____
 Comments: _____

Faculty Signature: _____
 Date: _____

DHBS 4307/DHCT 3307 DENTAL MATERIALS NAME _____
LABORATORY HANDOUT 2 – PIT AND FISSURE SEALANTS

OBJECTIVES: (1) to identify different types of sealants and observe the differences between light-cured and self-cured sealants and (2) to properly apply light cured sealant material on extracted posterior teeth mounted from previous exercise.

MATERIALS NEEDED: The following materials will be provided: Sealant kits (light-cured), pumice, visible light unit, safety glasses for visible light, sponges, brushes, articulating paper, and air supply for drying. Please bring cotton pliers, an explorer, slow speed, prophyl angles and extracted posterior teeth mounted in gypsum from first lab.

PROCEDURE: Clean the occlusal surfaces of extracted teeth with prophyl angle and fluoride free pumice. Rinse teeth and use air supply to thoroughly dry the teeth. Read manufacturer's instructions for different steps. For this exercise we are using the Ultra Seal. Apply etchant with a dabbing motion for 15 seconds. Rinse etched surfaces thoroughly. Dry teeth for 20 seconds. Do not touch the etched surface.

Light-cured sealant:

1. Apply PrimaDry primer to the dry surface for 5 seconds with the syringe tip/brush provided in the kit and gently air dry.
2. Apply the sealant sparingly with available applicator.
3. Place safety glasses for visible light on operator or over existing eyewear.
4. Remove any excess sealant before curing.
5. Place visible light within 1 mm but no touching the occlusal surface. Activate the light for 20 seconds per tooth. Do not look at the beam of light without safety glasses on.
6. Make an attempt to remove sealant with an explorer to check for retention. If you can scrape the sealant off you might not have cured long enough.
7. If you find a void in the sealant you can add more material and light cure. Please note that if this is on a patient you can do the same unless the sealant has been contaminated with saliva, then you have to re-etch.

8. After completion and check by an instructor, hand in the mounted teeth and this self-evaluation form completed.

Instructions: The instructor will make a check "✓" mark next to criteria accomplished and an "X" next to those not accomplished during the laboratory procedure.

- _____ All teeth are free of debris and pumice.
- _____ Surfaces to be sealed are properly etched. This step should be evaluated by the instructor before proceeding with next step.
- _____ All surfaces (pits and fissures) are covered properly with sealant.
- _____ Surfaces are not overfilled.
- _____ No sealant is present on interproximal surfaces.
- _____ Explorer does not remove sealant when retention is checked.
- _____ Attendance _____ Punctuality _____ Professionalism

- 5 – Excellent All evaluation criteria accomplished
 - 4 – Good All but one criteria accomplished
 - 3 – Average All but two criteria accomplished
 - 2 – Poor All but three criteria accomplished
 - 1 – Unsatisfactory* Four or more criteria not accomplished
- * = The student will be required to repeat the laboratory.

Student Evaluation
 Evaluation Points: _____
 Comments: _____

Faculty Evaluation
 Evaluation Points: _____
 Comments: _____

Student Signature: _____
 Date: _____

Faculty Signature: _____
 Date: _____

DHBS 4307/DHCT 3307 DENTAL MATERIALS NAME _____
LABORATORY HANDOUT 3 – COMPOSITE RESTORATION

OBJECTIVES:

1. To identify different types of composites (light cure, self cure and dual cure)
2. To differentiate between different particle size of composites
3. To identify different shades that range between white bleaching to yellow to gray
4. To identify different packaging of composites.
5. The student will recognize factors that affect mechanical properties of composites.
6. Pack and condense composite in a class v preparation following manufacturer instructions
7. Identify different polishing techniques.

MATERIALS NEEDED:

1. Typodont with the restorative teeth.
2. Composite (light cured) and etchant, and bonding agent.
3. Curing light.
4. Shade guide.
5. Polishing kit (burs and Soflex discs).
6. Slow speed with a latch, and friction grip connections.
7. Polishing paste (Prisma gloss/shimmer)
8. Prophy cups.
9. A caries detecting explorer.

PROCEDURE:

1. If a deep cavity exists apply calcium hydroxide or class ionomer as a liner.
2. Etch enamel and dentin with 34%-37% phosphoric acid for 30 seconds.
3. Flush the acid away with water and gently dry the surface with a stream of air. Surface will appear dull. (This will not be observed on plastic teeth.)
4. Apply the bonding agent which will penetrate the etched surface and provide micro mechanical retention of the restoration.
5. Pack the composite material into the cavity preparation incrementally and cure each increment for 40 seconds (darker shades require more curing time). Increments should not be more than 2mm. In thickness.
6. Finishing and polishing can be started immediately after light curing. Gross reduction is done using diamond or carbide finishing burs. Polishing is done with aluminum oxide abrasives with progressively fine grit size.
7. After polishing a layer of sealer e.g. fortify can be applied to seal the composite. Evaluate yourself and show an instructor the polished restoration.

Instructions: The instructor will make a check "✓" mark next to criteria accomplished and an "X" next to those not accomplished during the laboratory procedure.

- ____ The restoration is not underfilled.
 ____ The restoration is not overfilled.
 ____ No voids in the restoration.
 ____ The tip of an explorer should pass from tooth surface to composite without catching.
 ____ Attendance _____ Punctuality _____ Professionalism

- | | |
|---------------------|--|
| 5 – Excellent | All evaluation criteria accomplished |
| 4 – Good | All but one criteria accomplished |
| 3 – Average | All but two criteria accomplished |
| 2 – Poor | All but three criteria accomplished |
| 1 – Unsatisfactory* | Four or more criteria not accomplished |
- * = The student will be required to repeat the laboratory.

Student Evaluation

Evaluation Points: _____
 Comments: _____

Student Signature: _____
 Date: _____

Faculty Evaluation

Evaluation Points: _____
 Comments: _____

Faculty Signature: _____
 Date: _____

**DHBS 4307/DHCT 3307 DENTAL MATERIALS
LABORATORY HANDOUT 4 – DENTAL CEMENTS**

NAME _____

OBJECTIVES: (1) to manipulate zinc phosphate cement and other cements such as polycarboxylate, zinc oxide-eugenol, and glass ionomer.

MATERIALS NEEDED: glass mixing slab, cement spatula, paper mixing pad, zinc phosphate cement powder and liquid, kits of zinc oxide-eugenol, polycarboxylate and glass ionomer cements.

PROCEDURE: View the four videotapes - #605 to #608 (5 min. each). Notice in preparing and mixing zinc phosphate cement: (1) a dry, cool, glass mixing slab is used, (2) the size of the powder increments is indicated, (3) the liquid is dispensed last just before mixing, (4) a **minimum** time to mix is recommended, (5) a wide mixing area is used, and (6) a method is used to determine when a proper mix is obtained.

Notice the differences (size of increments, mixing time, mixing area, powder/liquid ratio) in the mixing techniques of polycarboxylate, zinc oxide-eugenol and glass ionomer cements compared to zinc phosphate.

Mix the zinc phosphate cement as many times as you think necessary to become proficient. Then mix it while an instructor observes and approves your technique. Then mix one of the other cements (your choice) to experience the different mixing technique. Do a self-evaluation.

Each step of the manipulation of zinc phosphate cement should be evaluated by the instructor. Hand in this self-evaluation form completed.

Instructions: The instructor will make a check "✓" mark next to criteria accomplished and an "X" next to those not accomplished during the laboratory procedure.

- _____ Powder is dispensed according to manufacturer's instructions.
- _____ Each portion of the zinc phosphate powder is mixed using wide strokes on the glass slab.
- _____ Each portion is mixed for at least 15 seconds before adding the next portion of powder.
- _____ Within 90 seconds the mix rises 1 inch from the slab when the spatula is elevated away from the mix.
- _____ A second cement was properly mixed.
- _____ Attendance _____ Punctuality _____ Professionalism

- | | |
|---------------------|--|
| 5 – Excellent | All evaluation criteria accomplished |
| 4 – Good | All but one criteria accomplished |
| 3 – Average | All but two criteria accomplished |
| 2 – Poor | All but three criteria accomplished |
| 1 – Unsatisfactory* | Four or more criteria not accomplished |

* = The student will be required to repeat the laboratory.

Student Evaluation

Evaluation Points: _____
Comments: _____

Student Signature: _____
Date: _____

Faculty Evaluation

Evaluation Points: _____
Comments: _____

Faculty Signature: _____
Date: _____

OBJECTIVES: (1) to mix dental amalgam using premeasured capsules, (2) to place and condense the amalgam mass into prepared Class I (occlusal and occlusal-buccal) molars, and (3) to carve appropriate anatomy. These restorations will then be used to learn an amalgam polishing technique.

MATERIALS NEEDED: The following materials will be provided: Amalgam capsules, amalgamator, amalgam squeeze cloth, amalgam carrier, amalgam condenser, and amalgam carver. Please bring an explorer, cotton pliers and mounted plastic teeth from first exercise.

PROCEDURE:

1. Watch the videotape #604 (7 min.).
2. Place a pre-measured amalgam capsule in the amalgamator and activate the amalgamator.
3. Remove the capsule, break it open and empty the mix onto an amalgam squeeze cloth.
4. Immediately start adding increments of the mix.
5. Condense each addition before adding more.
6. Repeat this until the tooth is overfilled. This insertion must not take more than 3 minutes.
7. Immediately begin to carve the anatomy as demonstrated in the videotape, with help from the instructors, if needed. Only mix, condense and carve amalgam for one tooth at a time.

After completion, make sure your name on the gypsum cast can be read. Hand in your work with this self-evaluation form completed.

Instructions: The instructor will make a check “✓” mark next to criteria accomplished and an “X” next to those not accomplished during the laboratory procedure.

- _____ Amalgam has appropriate anatomy.
- _____ Amalgam is overfilled.
- _____ Amalgam is underfilled.
- _____ Margins on the occlusal surface are completely sealed.
- _____ No excess of amalgam is present on the occlusal surface after carving.
- _____ Attendance _____ Punctuality _____ Professionalism

5 – Excellent	All evaluation criteria accomplished
4 – Good	All but one criteria accomplished
3 – Average	All but two criteria accomplished
2 – Poor	All but three criteria accomplished
1 – Unsatisfactory*	Four or more criteria not accomplished

* = The student will be required to repeat the laboratory.

Student Evaluation

Evaluation Points: _____
 Comments: _____

Student Signature: _____
 Date: _____

Faculty Evaluation

Evaluation Points: _____
 Comments: _____

Faculty Signature: _____
 Date: _____

OBJECTIVES: (1) to mix dental amalgam using pre-measured capsules, (2) to place and condense the amalgam mass into prepared Class II molar, and (3) to carve appropriate anatomy. These restorations will then be used to learn an amalgam polishing technique.

MATERIALS NEEDED: The following materials will be provided: Tofflemire bandholder and matrix band or an Omni Matrix, amalgam capsules, amalgamator, amalgam squeeze cloth, amalgam carrier, amalgam condenser, amalgam carver. Please bring an explorer, cotton pliers and mounted plastic teeth from first exercise.

PROCEDURE:

1. Properly place the matrix band around the Class II prepared tooth.
2. Place a wedge from the lingual surface.
3. Place a pre-measured amalgam capsule in the amalgamator and activate the amalgamator.
4. Remove the capsule, break it open and empty the mix onto an amalgam squeeze cloth.
5. Immediately start adding increments of the mix into the deepest area of the proximal box.
6. Condense each addition before adding more.
7. Repeat this until the tooth is overfilled. This insertion must not take more than 3 minutes.
8. Immediately begin to carve the anatomy as demonstrated in the videotape, with help from the instructors, if needed. Only mix, condense and carve amalgam for one tooth at a time.
9. After carving remove the wedge and gently remove the band in an occluso-lingual direction.

After completion, make sure your name on the gypsum cast can be read. Hand in your work with this self-evaluation form completed.

Instructions: The instructor will make a check “✓” mark next to criteria accomplished and an “X” next to those not accomplished during the laboratory procedure.

- _____ Matrix band is placed on Class II preparation. This step should be evaluated by the instructor before proceeding with the next step.
- _____ Amalgam has appropriate anatomy.
- _____ Margins on the occlusal surface are completely sealed.
- _____ No excess of amalgam is present on the occlusal surface after carving.
- _____ No overhangs present in the proximal box.
- _____ Attendance _____ Punctuality _____ Professionalism

5 – Excellent	All evaluation criteria accomplished
4 – Good	All but one criteria accomplished
3 – Average	All but two criteria accomplished
2 – Poor	All but three criteria accomplished
1 – Unsatisfactory*	Four or more criteria not accomplished

* = The student will be required to repeat the laboratory.

Student Evaluation

Evaluation Points: _____
 Comments: _____

Student Signature: _____
 Date: _____

Faculty Evaluation

Evaluation Points: _____
 Comments: _____

Faculty Signature: _____
 Date: _____

DHBS 4307/DHCT 3307 DENTAL MATERIALS NAME _____
LABORATORY HANDOUT 6 – AMALGAM POLISHING

OBJECTIVES: (1) to finish and polish amalgam after 24 hours, since crystallization is not complete, (2) to create a highly polished smooth surface which is less prone to tarnish and corrosion and (3) to refine anatomy, contour, and marginal integrity.

MATERIALS NEEDED:

You need to bring the following materials: Handpiece Kit from Educational Support Services. You checked this out at the first day of lab and your typodont with the restorative teeth.

The following materials were purchased in your kit:

1. White stone or green stone.
2. Amalgam polishing kit.
3. Finishing bur (round, flame shaped), abrasive rubber points (brownies, greenies).
4. A caries detecting explorer.

PROCEDURE:

1. Initial contouring and smoothing of the surface are done with a coarse abrasive or bur to produce a satiny appearance.
2. Use a finishing bur or a white stone on a slow speed to smooth cavosurface margins and any scratches, (feel with the tip of an explorer going back and forth from amalgam to tooth-no jumping or catching).
3. Rinse the tooth thoroughly.
4. Place some pumice in a medicine cup and mix with a small amount of water to make a thick mix.
5. Apply some of the pumice in a prophy cup and use to remove intermediate and fine scratches.
6. Rinse the tooth. Using a clean prophy cup, apply some tin oxide and polish to a high luster surface.

An alternate method is to obtain a high polish with medium and fine grit abrasive points (brownies greenies and super greenies).

NOTE: All steps must be performed using intermittent pressure and slow speed. Sustained pressure while polishing can cause an excessive temperature rise and irreversible pulpal damage.

Also, overheating can cause the amalgam surface to be cloudy though it may have a high polish. Cloudy appearance indicates that mercury has been brought to the surface which can result in corrosion of the amalgam.

Evaluate yourself and show an instructor the polished teeth, then turn in this self-evaluation form and teeth.

Instructions: The instructor will make a check “✓” mark next to criteria accomplished and an “X” next to those not accomplished during the laboratory procedure.

- _____ An explorer tip with light pressure should pass from tooth surface to the restoration surface and vice versa, without jumping or catching.
- _____ An amalgam surface should be smooth and free from any scratches or roughness.
- _____ Anatomy of occlusal surface is maintained.
- _____ High luster surface.
- _____ Attendance _____ Punctuality _____ Professionalism

- | | |
|---------------------|--|
| 5 – Excellent | All evaluation criteria accomplished |
| 4 – Good | All but one criteria accomplished |
| 3 – Average | All but two criteria accomplished |
| 2 – Poor | All but three criteria accomplished |
| 1 – Unsatisfactory* | Four or more criteria not accomplished |

* = The student will be required to repeat the laboratory.

Student Evaluation

Evaluation Points: _____
 Comments: _____

 Student Signature: _____
 Date: _____

Faculty Evaluation

Evaluation Points: _____
 Comments: _____

 Faculty Signature: _____
 Date: _____

DHBS 4307/DHCT 3307 DENTAL MATERIALS NAME _____
LABORATORY HANDOUTS 7 & 8 – ALGINATE IMPRESSIONS

OBJECTIVES: (1) Mix alginate impression material, (2) load the mix into impression trays and (3) make maxillary and mandibular impressions of classmate. The resulting impressions then will be used to make dental stone casts which will be trimmed for use in making a mouth guard and clinical observation models.

MATERIAL NEEDED: Alginate powder, water measurer, flexible mixing bowl and spatula, disposable maxillary and mandibular alginate impression trays, alginate adhesive (HOLD), dental stone, boxing wax, laboratory vibrator, and spray bottle of disinfectant solution.

PROCEDURE: Before entering the clinic, review Craig: p. 168-172.

1. For each impression, first paint adhesive in the plastic tray and let dry.
2. Measure the proper amount of water into the flexible mixing bowl.
3. Empty the contents of one alginate pouch, add to the water and mix rapidly for 45 to 60 seconds until a creamy mix is obtained.
4. Remove all the mix from the bowl at once and evenly distribute it into the alginate tray.
5. Wet a finger and smooth the surface of the mix. Insert the filled tray into a classmate's mouth as instructed.
6. When the alginate gels, remove the impression and spray with disinfectant.
7. Wrap the impression in a paper towel, which has been wetted with the disinfectant, until ready to pour lab stone into it.
8. Repeat the procedure for the mandibular impression.

Show an instructor the impressions. Hand in this self-evaluation form completed.

Instructions: The instructor will make a check "✓" mark next to criteria accomplished and an "X" next to those not accomplished during the laboratory procedure.

- _____ A creamy mix is obtained. This step should be evaluated by the instructor before proceeding to the next step.
 _____ Alginate in the tray has a smooth surface before making the impression.
 _____ Impressions reproduce hard and soft tissues with important landmarks.
 _____ Impressions have no major voids.
 _____ Attendance _____ Punctuality _____ Professionalism

- | | |
|---------------------|--|
| 5 – Excellent | All evaluation criteria accomplished |
| 4 – Good | All but one criteria accomplished |
| 3 – Average | All but two criteria accomplished |
| 2 – Poor | All but three criteria accomplished |
| 1 – Unsatisfactory* | Four or more criteria not accomplished |

* = The student will be required to repeat the laboratory.

Student Evaluation

Evaluation Points: _____
 Comments: _____

Student Signature: _____
 Date: _____

Faculty Evaluation

Evaluation Points: _____
 Comments: _____

Faculty Signature: _____
 Date: _____

**DHBS 4307/DHCT 3307 DENTAL MATERIALS
LABORATORY HANDOUT 9 – GYPSUM MODELS**

NAME _____

OBJECTIVES: 1) To prepare acceptable maxillary and mandibular gypsum study models and
2) to prepare maxillary cast for fabrication of a mouth protector.

MATERIALS NEEDED: Dental laboratory stone, flexible mixing bowl and spatula, boxing wax, powder
measurer, water measurer, plastic weighing boats, and vibrator.

Laboratory procedure for impression pouring:

1. For each of the maxillary and mandibular impressions, first start with the recommended amount of water, use one pre-weighed packet of lab stone, and place on the vibrator.
2. Pour into the impression over a vibrator incrementally until fully covering **all** the alginate surface of the impression and wait until the stone sets.
3. Models will reach initial set at 15 minutes.
4. Fill your prepared base former with stone.
5. Invert your model onto the base.
6. Gently press the model into the base mix until the vestibule is level with the base surface.
7. After the gypsum sets and cools remove the wax.
8. Place your name on each model for identification.
9. Hand in your maxillary and mandibular models with this self-evaluation form completed.

Instructions: The instructor will make a check “✓” mark next to criteria accomplished and an “X” next to those not accomplished during the laboratory procedure.

- _____ The stone mix is creamy. This step should be evaluated by the instructor before proceeding to the next step.
- _____ All surfaces of the model are as smooth as the mold.
- _____ No large voids (>1 mm) are present on the model.
- _____ No small voids (<1 mm) are present on the teeth of the model.
- _____ Attendance _____ Punctuality _____ Professionalism

The student will repeat this exercise if too many voids are present. **Three unsatisfactory attempts will be considered a point value of a “1” (failure) .**

5 – Excellent	All evaluation criteria accomplished
4 – Good	All but one criteria accomplished
3 – Average	All but two criteria accomplished
2 – Poor	All but three criteria accomplished
1 – Unsatisfactory*	Four or more criteria not accomplished

* = The student will be required to repeat the laboratory.

Student Evaluation

Evaluation Points: _____
Comments: _____

Student Signature: _____
Date: _____

Faculty Evaluation

Evaluation Points: _____
Comments: _____

Faculty Signature: _____
Date: _____

**DHBS 4307/DHCT 3307 DENTAL MATERIALS
LABORATORY HANDOUT 10 – MODEL TRIMMING**

NAME _____

OBJECTIVES: Trim maxillary and mandibular gypsum models.

MATERIALS NEEDED:

1. Gypsum models
2. Model trimmer
3. Lab knife

PROCEDURE:

1. Remove obstructions to placing the models in occlusion with a lab knife.
2. Place the maxillary model with the teeth on the counter top.
3. Score a line on the model base about 1.5 inches from the incisal and occlusal plane of the maxillary teeth. Trim the base to this line.
4. Place the models in occlusion with the maxillary base on the counter top, and score a line 3 inches high on the mandibular model. Trim to this line.
5. These two trims result in the planes of maxillary and mandibular bases being parallel to the occlusal plane.
6. Trim the posterior heel of the maxillary cast perpendicular to the midline, and reserve the maxillary tuberosity.
7. Articulate the models, and trim the back of the mandibular model using the maxillary model as a guide, and reserve the retromolar pad.
8. Trim the maxillary model at 70 degrees to half the depth of the vestibule.
9. Trim the maxillary model from canine to midline at 25 degrees.
10. Trim the heels of the cast and have both sides equal, about 1/2 inch.
11. With the models in occlusion, place the base of the maxillary cast on the platform, and carefully trim the sides and heels of the mandibular cast even and parallel to the maxillary cast.
12. Round off the anterior portion of the mandibular cast from cuspid to cuspid to 4 mm. from the anterior teeth, or half the depth of the vestibule.
13. Fill any small voids with a thin mix of stone, and sand the surfaces smooth. Clean the loose debris from the models with a toothbrush under running water.
Hand in your trimmed models with this self-evaluation form completed.

Instructions: The instructor will make a check “✓” mark next to criteria accomplished and an “X” next to those not accomplished during the laboratory procedure.

- _____ Base planes of the maxillary and mandibular casts are parallel to the occlusal plane.
_____ The maxillary posterior plane is perpendicular to the midline.
_____ The mandibular lateral and anterior planes are parallel to the maxillary planes.
_____ The maxillary and mandibular posterior planes are in the same plane.
_____ No gingival or tooth tissue was trimmed or abraded.
_____ Voids were filled and surfaces sanded.
_____ Attendance _____ Punctuality _____ Professionalism

- | | |
|---------------------|--|
| 5 – Excellent | All evaluation criteria accomplished |
| 4 – Good | All but one criteria accomplished |
| 3 – Average | All but two criteria accomplished |
| 2 – Poor | All but three criteria accomplished |
| 1 – Unsatisfactory* | Four or more criteria not accomplished |

* = The student will be required to repeat the laboratory.

Student Evaluation

Evaluation Points: _____
Comments: _____

Student Signature: _____
Date: _____

Faculty Evaluation

Evaluation Points: _____
Comments: _____

Faculty Signature: _____
Date: _____

**DHBS 4307/DHCT 3307 DENTAL MATERIALS
LABORATORY HANDOUT 11 – BLEACHING TRAYS**

NAME _____

OBJECTIVES: (1) To fabricate bleaching trays on your own gypsum models available from previous Lab. 2) To construct trays with periphery barely shy of gingival line and scalloped around inter-dental papilla.

MATERIALS NEEDED: 1) Maxillary and mandibular models trimmed from previous lab. 2) Ultra-dent Opalescence bleaching kit (provided).

PROCEDURE:

1. Attach the black mini tip to the ultra-dent LC Block out syringe.
2. Apply ½ mm of Ultra-dent LC Block out to the labial surfaces. By observing the intensity of the blue material you can learn to apply the right amount.
3. Keep block-out material 1.5 mm. from the gingival line and do not cover incisal edges or occlusal surfaces. Block out labial surfaces up to first molars.
4. Place model in light cure box for approximately 2 minutes. You can also use a hand held curing light approximately 20-40 seconds per tooth.
5. Wipe off oxygen inhibition layer that forms after curing the material.
6. Place an Ultra-dent of Tray in a Sta-Vac machine and lock in place.
7. Place gypsum model on the perforated plate.
8. Heat the try material until it sags approximately 1.5-2 inches.
9. Lower the frame and activate vacuum.
10. After cooling, cut excess bulk of material away and separate the tray from the cast.
11. Carefully trim tray shy of gingival margin .5 mm. scallop around inter-dental papilla as they become sore if tray covers them
12. Return try to model and check tray extension.
13. Flame polish edges with small torch one quadrant at a time. Hold each segment firmly against model with wet fingers for 3-5 seconds.
14. Have an instructor check your tray for proper extension and contour.

Instructions: The instructor will make a check “√” mark next to criteria accomplished and an "X" next to those not accomplished during the laboratory procedure.

- _____ Excessive placement of block out material.
- _____ Insufficient placement of block out material.
- _____ Tray has proper extension and contour.
- _____ Tray is not adequately scalloped.
- _____ Tray is too short buccally.
- _____ Tray does not seat well when fitted intraorally.
- _____ Attendance _____ Punctuality _____ Professionalism

5 – Excellent	All evaluation criteria accomplished
4 – Good	All but one criteria accomplished
3 – Average	All but two criteria accomplished
2 – Poor	All but three criteria accomplished
1 – Unsatisfactory*	Four or more criteria not accomplished

* = The student will be required to repeat the laboratory.

Student Evaluation

Evaluation Points: _____
Comments: _____

Faculty Evaluation

Evaluation Points: _____
Comments: _____

Student Signature: _____
Date: _____

Faculty Signature: _____
Date: _____

DHBS 4307/DHCT 3307 DENTAL MATERIALS NAME _____
LABORATORY HANDOUT 12A – SILICONE IMPRESSION

OBJECTIVES: (1) to mix silicone impression material, (2) to load mix into a quadrant stock tray, and (3) to obtain an impression of your classmate's lower quadrant.

MATERIALS NEEDED: Quadrant stock tray, tray adhesive, silicone impression material, loading gun and tips.

PROCEDURE:

- (1) Brush adhesive inside the stock tray and allow 5 minutes to dry. Try your gun without a tip, to make sure material is not clogged.
- (2) Place the tip and apply the heavy body material in the quadrant tray. Place a polyethylene spacer sheet over putty and sit tray slowly in your classmate's mouth. Remove impression when it reaches a rubbery consistency.
- (3) Remove the sheet from tray. Holding the gun apply the light body material over the putty evenly.
- (4) Place in your classmate's mouth and do not disturb for about 5 minutes. The impression is set clinically when it springs back out from pressure with a finger nail.
- (5) Remove impression without wiggling it to avoid distortion of the impression.

Evaluate yourself and show an instructor the impression for evaluation, then hand in this self-evaluation form completed.

Instructions: The instructor will make a check "✓" mark next to criteria accomplished and an "X" next to those not accomplished during the laboratory procedure.

- _____ Adhesive applied properly to tray and allowed to dry.
 _____ Impression have one uniform color, no streaks.
 _____ Impression is free of voids.
 _____ Impression includes all the teeth covered by the tray.
 _____ Attendance _____ Punctuality _____ Professionalism

***The student will repeat this exercise if excessive voids are present in the impression.**

- | | |
|---------------------|--|
| 5 – Excellent | All evaluation criteria accomplished |
| 4 – Good | All but one criteria accomplished |
| 3 – Average | All but two criteria accomplished |
| 2 – Poor | All but three criteria accomplished |
| 1 – Unsatisfactory* | Four or more criteria not accomplished |

* = The student will be required to repeat the laboratory.

Student Evaluation

Evaluation Points: _____
 Comments: _____

Student Signature: _____
 Date: _____

Faculty Evaluation

Evaluation Points: _____
 Comments: _____

Faculty Signature: _____
 Date: _____

DHBS 4307/DHCT 3307 DENTAL MATERIALS NAME _____
LABORATORY HANDOUT 12B – INTERIM/TEMPORARY CROWNS

OBJECTIVES: (1) To identify two major types of temporary/interim restorations. (2) To fabricate a polyvinyl siloxane putty template for temporary restorations. (3) To utilize template to fabricate a chair side temporary restoration (4) To trim and polish temporary restoration. (5) To use a temporary luting cement to cement the temporary restoration.

MATERIALS NEEDED: Typodont with intact tooth#18. Separate crown prepped tooth # 18 in your kit. Polishing bur block. Slow speed hand piece with a friction and latch attachments.

PROCEDURE:

Apply tray adhesive to a quadrant tray, and take an impression with alginate or polyvinyl siloxane of the lower left area.

- (1) After the material sets, remove the impression from typodont, and show to your instructor.
- (2) Set aside the impression.
- (3) Unscrew tooth #18 from the typodont and place crown prep tooth.
- (4) Retry the fit of the tray with the impression, and visualize an orientation point of the tray handle.
- (5) Fill the tray with temporary material (Integrity) only on tooth # 18, and reseal the tray on the typodont following your orientation guide.
- (6) Leave tray undisturbed for 2-3 minutes.
- (7) Remove tray. Temporary will either come out in the impression, or stay on the tooth.
- (8) Remove temporary, remove any excess material with a #15 blade.
- (9) Polish temporary with finishing burs, discs and paste.
- (10) Retry temporary crown for fit.
- (11) Check occlusion and trim high spots with a slow speed and a carbide bur.
- (12) Cement temporary crown with temporary luting cement

Instructions: The instructor will make a check “✓” mark next to criteria accomplished and an "X" next to those not accomplished during the laboratory procedure.

- _____ Impression with no voids, and all anatomical structures captured (teeth, gingival).
- _____ Temporary fabricated with no voids.
- _____ Temporary covers the prepped crown on #18 and not over or under extended.
- _____ Temporary finished and polished.
- _____ Adequate occlusal stops on the temporary.
- _____ Attendance _____ Punctuality _____ Professionalism

- | | |
|---------------------|--|
| 5 – Excellent | All evaluation criteria accomplished |
| 4 – Good | All but one criteria accomplished |
| 3 – Average | All but two criteria accomplished |
| 2 – Poor | All but three criteria accomplished |
| 1 – Unsatisfactory* | Four or more criteria not accomplished |

* = The student will be required to repeat the laboratory.

Student Evaluation

Evaluation Points: _____
 Comments: _____

Faculty Evaluation

Evaluation Points: _____
 Comments: _____

Student Signature: _____
 Date: _____

Faculty Signature: _____
 Date: _____