**Dental Materials**

**DENA &DENH 165**

**1 CREDIT HOUR**

**Spring Semester/2011 Office Location: HSHS**

**Instructor: Barbara Slatter Office Hours: W 5.30-6.30**

**E-Mail Address: bslatter@csi.edu Office Phone:**

**Please Communicate visa csi e-mail**

1. **Course Description:**

This course provides both the theoretical and laboratory/clinical applications of dental materials in the oral environment. From this knowledge base, students learn to understand the role of dental materials in the delivery of preventative and restorative care. The composition, properties, and manipulation of materials used in dentistry, as well as procedures used during application, will be emphasized.

2. **Pre-requisites:** Admissions into the CSI Dental Hygiene Program and successful completion of the first semester.

3. **Required Textbooks:**

1. Wilkins, Esther, Clinical Practice of the Dental Hygienist, 10th Edition 2008.

2. Hatrick, Eakle, Bird, Dental Materials Clinical Applications for Dental Assistants and Dental Hygienists, 2003 Elsevier

3. CSI Clinic Policies and Procedure Manual 2010-2011

4. **Course Goals and Objectives:**

Identify reasons for a knowledgeable base to the science of dental materials:

* Provide students with the principles of dental materials so they can understand the rationale for their use. Students will be involved in selection and manipulation of dental materials
* Identify characteristics dental materials must possess to endure in the oral environment
* Students will demonstrate procedures involving dental materials and the proper maintenance of restoration and oral prostheses

Provide students the opportunity to apply their knowledge through clinical and laboratory procedures

List phases of material

Contrast bonding characteristics of metals ceramics plastics and composites

Relate Physical and mechanical properties of materials

Name units of measure for properties of Density, Heat capacity, stress, strain, elasticity

List and explain differences of stress relaxation and stress concentration

Provide students the opportunity to test their knowledge and prepare for board examinations

Adhesive material

Polymeric restorative materials

Amalgam

Dental Cements

Impression Materials

Gypsum Materials

Prostheses Materials

Acrylic Resins

Discuss and integrate radiographic appearances of dental materials – radiopaque and radiolucent

Provide students resources they will need in order to obtain updates on dental materials and dental manufacturers:

Bleach Trays and Tooth Whitening

Effects on the teeth

Oral appliances

Instruments of dental materials, sharpening, maintenance and materials

Infection Control and safety protocol for handling

Impressions

Dentures

Oral prostheses

5. **Outcomes Assessment:**

Faculty will know students have achieved the course objectives when they have completed the assessment exams, Laboratory competencies. They will demonstrate didactic competency through evaluation.

Learning activities will be submitted for course credit.

6. **Policies and Procedures:**

* + - Students will be expected to be in attendance for all lectures
    - All exams must be taken during the scheduled week and within the allotted time. If they are not taken during the scheduled times, there will be a 10% reduction in grade.
    - No deduction in points may occur if:
      1. A prior notification has been given to instructor and the situation valid
      2. A serious situation prevents prior notification to instructor

**ACADEMIC DISHONESTY:**

Academic dishonesty is grounds for immediate dismissal from the program.  Some examples of academic dishonesty consist of (but are not limited to):

Plagiarism on tests, homework, assignments, or other

Misrepresenting student assignments

“Cheating” as defined in the CSI student handbook “the improper use of books, notes, other students’ tests, or other aides during an examination

Facilitating dishonesty – knowingly helping or attempting to help another commit an act of academic dishonesty, including substituting for another in an examination, or allowing others to represent as their own one’s papers, reports, or academic works

7. **Grading Practices: Total points 1000**

Quiz #1 – 20 points

Quiz #2 – 20 points

Quiz #3 – 20 points

Exam #4 – 100 points

Quiz #5 – 20 points

Quiz #6 – 20 points

Quiz #7 – 20 points

#8 Midterm – 100 points

Quiz #9 – 20 points

#10 – 100 points-National Board Question

Quiz #11 – 20 points

Quiz #12 – 20 points

Exam #13 – 100 points

Quiz #14 – 20 points

Quiz #15 – 20 points

#16 Final Exam 200 points

A = 900-1000 of the maximum Points Possible

B = 800-899 of the maximum Points Possible

C = 700-799 of the maximum Points Possible

D = unacceptable

70% will be considered unsatisfactory in completing course requirements.

8. **Library Use if Applicable:**

Copies of required text are available in the CSI Library

9. **CSI E-mail**

Since email is the primary source of written communication with students, all registered CSI students get a college email account. Student e-mail addresses have the following format: [<address>@eaglemail.csi.edu](mailto:address@eaglemail.csi.edu) where <address> is a name selected by the student as a part of activating his/her account. Students activate their accounts and check their CSI e-mail online at <http://eaglemail.csi.edu>.   Instructors and various offices send messages to these student accounts. Students must check their **CSI e-mail accounts regularly to avoid** missing important messages and deadlines.  At the beginning of each semester free training sessions are offered to students who need help in using their accounts.

10. **On-line course evaluation statement:**

To help instructors continually improve courses, students are strongly encouraged to go online to [http://evaluation.csi.edu](http://evaluation.csi.edu/) and complete anonymous evaluations which open two weeks before the end of the course and close the last day of class.  When students enter the site, they find evaluations for their enrolled courses. Thank you for this valuable input!

11. **Disabilities:**

* Disabilities:  Any student with a documented disability may be eligible for related accommodations.  To determine eligibility and secure services, students should contact the coordinator of Disability Services at their first opportunity after registration for a class.  Student Disability Services is located on the second floor of the Taylor Building on the Twin Falls Campus
  + 208.732.6250 (voice)
  + 208.734.9929 (TTY)

**Topical Outline and objectives for the Course:**

Week 1 – Introduction to Dental Materials

* Explain the importance of the study of dental materials for the dental practitioner.
* Review the historical development of dental materials.
* List the agencies responsible for setting standards and specifications of dental materials.
* List the requirements necessary for a product to qualify for the ADA Seal of Acceptance.
* Describe the long term clinical requirements of therapeutic and restorative materials.
* Describe the effects of moisture and acidity on dental materials.
* Define stress, strain, thermal conductivity, thermal expansion, contraction, biocompatibility, microleakage, hue, value, chroma adhesion, viscosity, wettablity, density, volume, elasticity, dustility, malleability and brittleness.
* Describe the variables in the manipulation of dental materials.

Week 1 Impression Materials

* Describe the purpose of an impression
* List the various characteristics of impression materials and explain their differences, advantages and disadvantages
* Describe the important characteristics of impression materials
* Demonstrate proper handling of alginate impressions
* Apply trouble shooting to problems experienced with alginate impressions
* Demonstrate tray selection and describe criteria for tray selection

Week 2- Gypsum Products

* Describe the chemical and physical nature of gypsum products
* Differentiate between diagnostic casts, working casts, and dies
* Compare the following properties and behaviors of gypsum products: strength, dimensional accuracy, solubility and reproduction of detail
* List the ADA recognized gypsum products and their most appropriate uses
* Explain the procedure for mixing and handling gypsum products
* Identify the three classifications of dental wax and the properties of each

Week 3– Oral Environment and Patient Considerations

* Define dimensional change and linear coefficient of thermal expansion, and give examples of their importance to clinical dentistry.
* Give examples of where thermal and electrical properties of restorative materials are important in clinical dentistry.
* List examples of where solubility and water sorption are important in the success of dental restorative materials.
* Describe when wettability of tooth structure or dental materials is important clinically.
* Define stress and strain, and illustrate how they differ.
* Describe how elastic modulus, yield strength, ultimate strength, and elongation are important in the selection of dental materials.
* Compare the elastic moduli of dentin, enamel, composites, bonding agents, and the hybrid layer of the tooth–composite interface.
* Describe how resilience and toughness differ from strength properties.
* List the challenges for long term clinical performance of dental materials.
* Describe the basic infection control methods for the handling of dental materials in the treatment area.
* Identify job related health and safety hazards for employees in the dental office and methods of prevention for each
* Describe MSDS and how they are utilized

Week4 – Dental Sealants

* Explain how sealants protects teeth from caries
* Discuss various methods of sealant delivery
* List materials and methods for sealant placement

Week 5 – Preventative Fluoride Agents and Mouth Guards

* Explain how Fluoride protects teeth from caries
* Discuss various methods of fluoride delivery
* List materials for the fabrication of mouth guards

Week 5 – Bleaching Materials

* Describe the methods used to bleach teeth
* Explain the differences between professionally supervised home bleaching and over-the-counter systems

Week 6 – Dental Implants

* Describe the basic types of implants used in dentistry today
* Describe the different types of metals used for dental implants
* Explain osseointegration of an implant
* Discuss the clinical care of dental implant fixtures
* Explain the rationale for the plastic instruments for cleaning implants and discuss when the metal instruments can be used
* List the home care aids for implants and explain how they are used

Week 7 – Dental Cements and Provisional Restorations

* Discuss the uses of cements in dentistry for:
  + Pulpal protection
  + Luting
  + Restorations
  + Surgical dressing
* Describe properties of cement, and explain how these properties affect selection of cement for a dental procedure
* Discuss the advantages and disadvantages of each cement
* Discuss component of each cement
* Discuss how these components affect the properties of the cement
* Discuss the advantages and disadvantages of each cement
* State the purpose of a metal provisional crown
* List examples of circumstances that may require a provisional coverage
* List the properties of provisional material
* List the advantages and disadvantages of acrylic and composite provisional material
* Describe the technique for fabrication of metal, poly carbonate, custom and cement provisional restorations

Week 8- Principles of Bonding

* Explain the effects of acid etching on enamel and dentin
* Explain the bonding process and the differences in bonding to enamel, dentin, metal and porcelain.
* Describe the agents used for bonding
* List the various esthetic restorative materials and the advantages and disadvantages of each
* Discuss the differences between direct and indirect composite restorations
* List Factors that interfere with good bonding
* List Factors that contribute to tooth sensitivity after bonding

Week 9 - Composites, Glass Ionomers, and Compomers

* Describe the various types of composite resin restorative materials.
* Discuss the uses, advantages and disadvantages of each type of composite resin.
* Describe how fillers affect the properties of composites.
* Describe the composition of glass ionomer restoratives and their uses, advantages and disadvantages.
* Explain the effects of fluoride-releasing resin-modified glass ionomer restorations on prevention of recurrent caries
* List the components of compomers
* Describe the uses of compomers

Week 10 – National Board Questions

Week 11 - Dental Amalgam

* Discuss the safety of amalgam as a restorative material
* List the main components in dental amalgam
* Describe the advantages of high-copper amalgams over low-copper amalgams
* Describe the role of the gamma-2 phase in corrosion of the amalgam
* Describe the particle shapes in the lathe-cut, admix and spherical alloys and discuss their effects on the condensation resistance of the freshly mixed amalgam

Week 12 - Abrasion Finishing and Polishing

* Define abrasion, finishing polishing and cleansing
* Discuss the purpose of the action on the dental restorations and the tooth surfaces
* List the contraindications to the use of abrasives on tooth structure and restorations
* Describe the clinical decisions used to determine which abrasive to use when finishing, polishing or cleansing dental retractions or tooth structures
* Relate patient education instructions for prevention and removal of stain from tooth surfaces and restorations

Week 13 - Dental Ceramics – Casting Metal, Solders and Wrought Metal Alloys

* Describe the mechanism for bonding porcelain to metal for porcelain fused to metal crowns (PFM)
* List types of alloys used in PFM crowns
* Describe where most failures occur in PFM Crowns
* Know the methods of fabrication for all-ceramic restorations
* List indications for Veneers
* Describe the differences among the types of gold alloy used for dental restorations
* Differentiate among high-noble, noble, and base-metal alloys
* Describe the characteristics needed for porcelain bonding allows
* Describe the characteristics of metals used for casting partial denture frameworks
* Explain biocompatibility problems associated with some alloys

Week 14 - Polymers for Prosthetic Dentistry:

* Describe the formation of long-chain polymers from monomers
* Explain the effect that cross-linking has on the physical properties of polymers
* Describe the procedure for heat processing a denture
* Explain the difference between hard and soft lining materials
* Describe the process for repairing acrylic dentures
* Explain the differences between long and short term soft liners
* List the indications for the use of acrylic teeth versus porcelain teeth

Week 15 – Dental Photography

* Describe the uses of Dental photography
* Explain the vital functions of SLR
* Describe the procedure taking publishable dental photos
* Explain the difference between position of photo mirrors
* Describe the process for taking dental photos with out fog and with clarity
* Explain procedure to down load into a patient’s chart or print dental photos
* List the many uses for before and after dental photographs

Week 16 - FINAL