Maui Community College
Course Outline

August 2007

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Under Amnesty Program
SLOs Updated & Linked To Content
COWIQ Grid Prepared

1. Alpha DENT Number 154

   Course Title Dental Materials

   Credits 1

   Department Allied Health Author

   Date of Outline 2/5/09 Effective Date Spring 2010 5-year Review Date Spring 2015

2. Course Description: Provides an orientation of physical and chemical properties of dental materials, characteristics and manipulation of impression materials, gypsum products, investments, waxes, cements, resins, metallic and non-metallic restorative materials.

   Cross-list

   Contact Hours/Type Lecture/Lab - two (2)

3. Pre-requisites DENT 151 with C or better

   Pre-requisite may be waived by consent ☒ yes ☐ no

   Co-requisites DENT 165, DENT 152, DENT 177

   Recommended Preparation

4. Function/Designation ☐ AA Category Additional Category

   ☒ AS Allied Health - Dental Hygiene Category List Additional Programs and Category:

   ☐ AAS Program Category List Additional Programs and Category:

   ☐ BAS Program Category ☐ Developmental/Remedial

   ☐ Other/Additional: Explain:

See Curriculum Action Request (CAR) form for the college-wide general education and/or

Chancellor *Approval Date* 9/2/09

program SLOS this course supports.

☐ This course outline is standardized and/or the result of a community college or system-wide agreement.
Responsible committee:

5. Student Learning Outcomes (SLOs): List one to four inclusive SLOs.
For assessment, link these to #7. Recommended Course Content, and #9. Recommended Course Requirements & Evaluation. Use roman numerals (I., II. III.) to designate SLOs
On successful completion of this course, students will be able to:

I. Identify the structure and composition of various materials used in dentistry;
II. Identify the uses, manipulations, and properties of various materials used in dentistry;
III. Demonstrate competency in manipulation of various materials used in dentistry.
IV.

6. Competencies/Concepts/Issues/Skills
For assessment, link these to #7. Recommended Course Content, and #9. Recommended Course Requirements & Evaluation. Use lower case letters (a., b., c...n.)to designate competencies/skills/issues
On successful completion of this course, students will be able to:

Introduction to Dental Materials

a. Explain the importance of the study and understanding the uses of dental materials for the dental assistant.
b. List the general uses and categories of dental materials.
c. List and describe the properties of dental materials, including considerations of their use in dentistry.
d. Describe the use, necessity, rationale, and components of universal (standard precautions and personal protective equipment (PPE) when performing invasive dental procedures or working with dental materials and when performing related laboratory procedures.
e. Relate the importance of communication with the commercial dental laboratory, maintaining a case tracking system, handling of impressions, prosthesis, and appliances before and after patient treatment.
f. Describe the role of the dental assistant relevant to ordering dental supplies and materials, inventory control, and shelf life.
g. List the qualities of the oral environment that make it challenging for long term clinical performance of dental materials.
h. Define stress, strain, and ultimate strength.
i. Describe the effects of moisture and acidity on dental materials.
j. Define thermal conductivity and thermal expansion and contraction.
k. Describe the process used to achieve mechanical, chemical, and bonding retention.
l. Describe microleakage and how the results of this process can lead to recurrent decay and postoperative sensitivity.
m. Define biocompatibility.

Principles of Bonding

n. Describe the role and duties of the dental assistant in the use, instrumentation, manipulation, and application of acid etch and bonding agents.
o. Discuss the effects of acid etching on enamel and dentin.
p. Describe the basic steps of bonding
q. Describe the agents used for bonding.

r. Discuss factors that interfere with good bonding.
s. Describe the amalgam bonding technique.
t. Explain differences in bonding to enamel, dentin, metal, and porcelain.
u. List the factors that contribute to tooth sensitivity after bonding.

Direct and Indirect Esthetic and Restorative Materials

v. Describe the various types of composite resin restorative materials.
w. Discuss the uses, advantages, and disadvantages of each type of composite resin.
x. Discuss the procedural differences between direct and indirect composite restorations.
y. Describe the composition of glass ionomer restoratives and their uses, advantages, and disadvantages.
z. Explain the effect of fluoride releasing, resin-modified glass ionomer restorations on prevention of recurrent decay.

Fluoride and Sealants in Prevention

aa. Describe the use of fluoride in prevention.
bb. Explain how fluoride protects teeth from caries.
cc. Discuss the various methods for fluoride delivery.
dd. Discuss the use of sealants for prevention of pit and fissure caries.

Amalgam and Composite Materials

ee. Discuss the general types of restorative materials used in dentistry and their specific applications.
ff. Describe the role and duties of the dental assistant in the use, instrumentation, manipulation, application, and clean-up procedures required when placing amalgam restorations.
gg. Describe the role and duties of the dental assistant in safe handling of mercury, the principles of mercury hygiene, and the necessary steps required to safely clean up a mercury spill.
hh. Discuss the safety of amalgam as a restorative material.
ii. List the main components in dental amalgam.
jj. Define creep, corrosion, and tarnish.
kk. Describe the different types of metals used for dental implants.
ll. Explain the purpose of a post.
mm. Describe the role and duties of the dental assistant in the use, instrumentation, manipulation, application, and clean-up procedures required when placing composite restorations.
nn. Describe the role and duties of the dental assistant in the use, instrumentation, manipulation, application, and clean-up procedures required when placing glass ionomer restorations.

Finishing and Polishing

oo. Define and discuss abrasion, finishing, polishing, and cleansing.
pp. Describe the abrasives used and procedure for finishing and polishing metals, composite, and porcelain.

Dental Cements

qq. Discuss the uses of cements in dentistry for pulpal protection, luting, restorations, and surgical dressing.
rr. Describe the properties of cement and how these properties affect selection of a cement for a dental procedure.
ss. Describe the role and duties of the dental assistant in the use, instrumentation, manipulation, application, and clean-up procedures required when using zinc phosphate cement.

tt. Describe the role and duties of the dental assistant in the use, instrumentation, manipulation, application, and clean-up procedures required when using zinc oxide eugenol.

uu. Describe the role and duties of the dental assistant in the use, instrumentation, manipulation, application, and clean-up procedures required when using polycarboxylate cement.

vv. Describe the role and duties of the dental assistant in the use, instrumentation, manipulation, application, and clean-up procedures required when using glass ionomer cement.

ww. Discuss the mixing technique for temporary cement (Temp Bond).

Impression Materials

xx. Describe the general types of impression materials used in dentistry and their specific applications.

yy. Describe the role and duties of the dental assistant in the use, instrumentation, manipulation, application, and clean-up procedures required when working with hydrocolloid impression (irreversible and reversible) materials.

zz. Describe the role and duties of the dental assistant in the use, instrumentation, manipulation, application, and clean-up procedures required when working with polysulfide elastomeric impression materials.

aaa. Describe the role and duties of the dental assistant in the use, instrumentation, manipulation, application, and clean-up procedures required when working with condensation silicone and addition polysiloxane/ polyvinyl elastomeric impression materials.

bbb. Describe the role and duties of the dental assistant in the use, instrumentation, manipulation, application., and clean-up procedures required when working with polyether impression materials.

ccc. Describe the role and duties of the dental assistant in disinfection of various dental impression materials.

ddd. Describe the role and duties of the dental assistant in procedures required when working with bite registration paste.

Dental Wax

eee. Identify the common components of dental waxes.

fff. Identify the properties of waxes.

ggg. Describe the role and duties of the dental assistant in the care, storage, and handling of dental waxes.

hhh. Describe specific disinfection procedures as they relate to waxes used in dental procedures.

iii. Differentiate between direct and indirect waxings.

Gypsum Products

jjj. Describe the role of the dental assistant in the use, composition, and properties of plaster and stone (gypsum materials) used in dentistry.

kkk. Describe the steps required for the dental assistant to pour and trim study models for diagnostic purposes.

lll. Differentiate between negative and positive reproduction.

mmm. Differentiate between diagnostic casts, working casts, and dies.

Polymers for Prosthetic Dentistry

nnn. Describe the formation of long-chain polymers from monomers.

ooo. Describe the stages of addition polymerization.

ppp. List the important properties of acrylic resins.

qqq. Explain the difference between hard and soft liners.

rrr. Describe the advantages and disadvantages of chairside and laboratory hard liners.

sss. Describe the home care regimen for complete and partial dentures that patients should follow.

Dental Resins and Provisional Restoration

ttt. State the purpose of the provisional restoration.

uuu. List examples of circumstances that may require provisional coverage.

vvv. List the advantages and disadvantages of preformed and custom crowns.

www. Describe the role of the dental assistant in fabricating temporary (provisional) acrylic restorations.

Bleaching Materials

xxx. Describe the methods used to bleach teeth.

yyy. Discuss the similarities and differences among the materials used to bleach teeth.

zzz. Explain the differences between professionally supervised home bleaching and over-the-counter systems.

aaaa. Describe the role of the dental assistant in fabricating self-curing custom resin trays, light-cured custom resin trays, vacuum formed custom trays, and thermoplastic custom trays.

CLINICAL COMPETENCIES

Impression Materials

bbbb. Demonstrate various mixing techniques and manipulation for dental materials.

cccc. Demonstrate how to take an alginate impression suitable for diagnostic casts.

dddd. Demonstrate tray selection for an alginate impression.

eeee. Demonstrate mixing alginate, loading and seating the tray, and removing the impression.

ffff. Demonstrate proper handling of alginate impression.

gggg. Demonstrate tray selection for an edentulous impression.

Bonding

hhhh. Demonstrate procedures for bonding to enamel and dentin.

Direct and Indirect Esthetic and Restorative Materials

iiii. Demonstrate how to place a composite resin restoration in a prepared typodont tooth.

jjjj. Demonstrate steps to be taken to ensure proper conditions for shade taking.

kkkk. Demonstrate how to apply sealants on a prepared typodont tooth.

Amalgam and Composite Materials

llll. Demonstrate how to properly mix and place amalgam in a prepared typodont tooth.

Finishing and Polishing

mmmm. Finish and polish a pre-existing amalgam restoration.

nnnn. Polish a pre-existing composite restoration.

Dental Cements

oooo. Apply the mixing technique for zinc oxide eugenol cement (ZOE).

pppp. Apply the mixing technique for glass ionomer lining cement.

qqqq. Apply the mixing technique for glass ionomer luting cement (Ketac-Cem).

rrrr. Apply the mixing technique for calcium hydroxide liner (Dycal).

ssss. Apply the mixing technique for temporary cement (Temp Bond).

tttt. Apply the mixing technique for zinc phosphate cement.

Additional Impression Materials

uuuu. Apply the mixing technique for polyether impression material.

vvvv. Apply the mixing technique for vinyl polysiloxane impression material.

wwww. Apply the mixing technique for polysulfide impression material.

xxxx. Apply the mixing technique for polyvinyl siloxane (PVS) impression material (express or extrude) using the putty/wash technique.

Dental Wax

yyyy. Demonstrate how to obtain a wax bite registration.

Gypsum Products

zzzz. Obtain, pour, and trim study models for diagnostic purposes.

aaaaa. Demonstrate differences between negative and positive reproductions.

Polymers for Prosthetic Dentistry

bbbbb. Perform a denture repair and polish acrylic.

ccccc. Fabricate a custom tray from an edentulous cast.

ddddd. Mount upper model on an articulator.

Dental Resins and Provisional Restoration

eeeee. Fabricate a custom provisional crown.

Bleaching Materials

fffff. Fabricate custom bleaching trays from stone casts using thermoplastic vinyl tray material.

ggggg. Fabricate a sports mouth guard.

7. Suggested Course Content and Approximate Time Spent on Each Topic
Linked to #5. Student Learning Outcomes and # 6 Competencies/Skills/Issues

1 week Introduction to Dental Materials, Principles of Bonding (I, II, III, a, b, c, d, e, f, g, h, i, j, k, l, m n, o, p, q, r, s, t, u, hhhh)
1 week Amalgam and Composite Materials, Direct and Indirect Esthetic and Restorative Materials (I, II, III, v, w, x, y, z, ee, ff, gg, hh, ii, jj, kk, ll, mm, nn, iiii, jjjj, kkkk, llll)
1 week Fluoride and Sealants in Prevention (I, II, III, aa, bb, cc, dd)
1 week Finishing and Polishing (I, II, oo, pp, mmmm, nnnn)
1 week Dental Cements (I, II, III, qq, rr, ss, tt, uu, vv, ww, oooo, pppp, qqqq, rrrr, ssss, tttt)
4 weeks Impression Materials (I, II, III, xx, yy, zz, aaa, bbb, ccc, ddd, bbbb, cccc, dddd, eeee, ffff, gggg, uuuu, vvvv, wwww, xxxx)
1 week Dental Wax (I, II, III, eee, fff, ggg, hhh, iii, yyyy)
2 weeks Gypsum Products (I, II, III, jjj, kkk, lll, mmm, zzzz, aaaaa)
1 week Polymers for Prosthetic Dentistry (I, II, III, nnn, ooo, ppp, qqq, rrr, sss, bbbbb, ccccc, ddddd)
1 week Dental Resins and Provisional Restoration (I, II, III, ttt, uuu, vvv, www, eeeee)
1 week Bleaching Materials (I, II, III, xxx, yyy, zzz, aaaa, fffff, ggggg)

8. Text and Materials, Reference Materials, and Auxiliary Materials

Appropriate text(s) and materials will be chosen at the time the course is offered from those currently available in the field. Examples include: Hatrick, C. et al., Dental Materials: Clinical Applications for Dental Assistants and Dental Hygienists, current edition, Elsevier.

Bird, D. and Robinson, D., Torres and Ehrlich Modern Dental Assisting, current edition, Elsevier.

Bird, D. and Robinson, D., Student Workbook to Accompany Torres and Ehrlich Modern Dental Assisting, current edition, Elsevier.

Appropriate reference materials will be chosen at the time the course is offered from those currently available in the field. Examples include: Boyd, L., Dental Instruments: A Pocket Guide, current edition, Elsevier.

Durley, C. et al., The DANB Review, current edition, Dental Assisting National Board.

Durley, C. et al., DANB's Glossary of Dental Assisting Terms, current edition, Dental Assisting National Board.

Finkbeiner, B., Four-Handed Dentistry: A Handbook of Clinical Application and Ergonomic Concepts, current edition, Prentice Hall.

Massler, M. and Schour, I., Atlas of the Mouth, current edition, American Dental Association.

Miller, B. et al., Miller-Keane Encyclopedia and Dictionary of Medicine, Nursing and Allied Health, current edition, Elsevier.

Mosby et al., Mosby's Dental Dictionary, current edition, Elsevier.

Mosby et al., Review Questions and Answers for Dental Assisting, current edition, Elsevier.

Appropriate auxiliary materials will be chosen at the time the course is offered from those currently available in the field. Examples include: State of Hawaii Department of Commerce and Consumer Affairs, Hawaii Administrative Rules Title 16, Chapter 79, Dentists and Dental Hygienists.

State of Hawaii Department of Commerce and Consumer Affairs, Hawaii Revised Statutes Chapter 448, Dentistry.

9. Suggested Course Requirements and Evaluation
Linked to #5. Student Learning Outcomes (SLOs) and #6 Competencies/Skills/Issues
Specific course requirements are at the discretion of the instructor at the time the course is being offered. Suggested requirements might include, but are not limited to:

- Prompt attendance is required at all class sessions. (I, II, III, a - ggggg)
- Students will be responsible for completing all assigned reading material in text before each class session. (I, II, III, a - ggggg)
- Complete various learning skills exercises. (I, II, III, a - ggggg)
- Complete various competency exercises. (I, II, III, a - ggggg)
- Complete various laboratory exercises. (I, II, III, bbbb - ggggg)
- Complete all projects. (I, II, III, a - ggggg)

EVALUATION AND GRADING

Quizzes & weekly proficiencies	20% (I - III, a - ggggg)
Midterm	15% (I, II, a - aaaa)
Final exam	25% (I, II, a - aaaa)
Final lab OSCE (Objective Structured Clinical Examination)	25% (I - III, bbbb - ggggg)
Attendance/ Attitude/ Preparation	15% (I - III, a - ggggg)

10. Methods of Instruction

Instructional methods will vary considerably by instructor. Specific methods are at the discretion of the instructor teaching the course and might include, but are not limited to:

- Participation in class lecture/ discussion.
- Reading assigned portions in textbooks, journal articles, and/ or modules.
- Viewing various audiovisual materials.
- Demonstration and simulation.
- Supervised lab practice.
- Supervised clinical practice.
- Discovery learning.
- OSCE.

11. Assessment of Intended Student Learning Outcomes Standards Grid attached

Grid of Maui Community College Student Learning Outcomes- Dental Assisting

KEY: 3 Major Emphasis: The student is actively involved (uses, reinforces, applies, and evaluated) in the student learning outcomes. The learner outcome is the focus of the class.
2 Moderate Emphasis: The student uses, reinforces, applies and is evaluated by this learner outcome, but it is not the focus of the class.
1 Minor Emphasis: The student is provided an opportunity to use, reinforce, and apply this learner outcome but does not get evaluated on this learner outcome.
0 No Emphasis: The student does not address this learner outcome.

Dental Assisting Educational Standards	DENT 120	DENT 150	DENT 151	DENT 152	DENT 164	DENT 165	DENT 176	DENT 177
I Demonstrate an understanding of dental assistant roles including the legal, professional, and ethical responsibilities within the community	2	3	3	3	1	1	1	1
II Demonstrate basic theoretical knowledge and skills in biological science, dental radiology, chairside dental assisting, and business office procedures to support dental assisting practice and build the foundation for an associate degree dental hygiene program	3	3	3	3	3	3	3	3
III Demonstrate a commitment to life long learning and advancing competency over a lifetime of clinical practice	1	2	1	3	1	1	1	1
General Education Standards								
Standard 1 - Written Communication								
	DENT 120	DENT 150	DENT 151	DENT 152	DENT 164	DENT 165	DENT 176	DENT 177
Outcome 1.1 Use writing to discover and articulate ideas	3	3	2	3	0	0	1	1
Outcome 1.2 Identify and analyze the audience and purpose for any intended communication	3	3	2	3	0	0	1	1
Outcome 1.3 Choose language, style, and organization appropriate to particular purposes and audiences	3	3	3	3	0	0	1	1
Outcome 1.4 Gather information and document sources appropriately	3	3	3	0	0	0	1	2
Outcome 1.5 Express a main idea as a thesis, hypothesis, or other appropriate statement	1	3	0	0	0	0	1	1
Outcome 1.6 Develop a main idea clearly and concisely with appropriate content	1	3	0	0	0	0	1	1
Outcome 1.7 Demonstrate a mastery of the conventions of writing, including grammar, spelling, and mechanics	3	3	0	0	0	0	1	1
Outcome 1.8 Demonstrate proficiency in revision and editing	3	3	0	1	0	0	1	1
Outcome 1.9 Develop a personal voice in written communication	3	3	0	3	0	0	1	0
Standard 2 Quantities Reasoning								
Outcome 2.1 Apply numeric, graphic, and symbolic skills and other forms of quantitative reasoning accurately and appropriately	3	1	3	3	0	0	3	3
Outcome 2.2 Demonstrate mastery of mathematical concepts, skills, and applications, using technology when appropriate	3	0	3	3	0	0	3	3
Outcome 2.3 Communicate clearly and concisely the methods and results of quantitative problem solving	3	2	3	3	0	0	3	3
Outcome 2.4 Formulate and test hypotheses using numerical experimentation	0	2	0	0	0	0	3	3
Outcome 2.5 Define quantitative issues and problems, gather relevant information, analyze that information, and present results	2	3	0	0	0	0	3	3
Outcome 2.6 Assess the validity of statistical conclusions	0	1	0	0	0	0	3	0
Standard 3 Information Retrieval and Technology								
Outcome 3.1 Use print and electronic information technology ethically and responsibly	3	3	3	3	0	0	1	2
Outcome 3.2 Demonstrate knowledge of basic vocabulary, concepts, and operations of information retrieval and technology	3	3	0	2	0	0	1	2
Outcome 3.3 Recognize, identify, and define an information need	3	3	0	3	0	0	1	2
Outcome 3.4 Access and retrieve information through print and electronic medica, evaluating the accuracy and authenticity of that information	3	3	0	1	0	0	1	2
Outcome 3.5 Create, manage, organize and communicate information through electronic media	3	3	0	0	0	0	1	2
Outcome 3.6 Recognize changing technologies and make informed choices about their appropriateness and use	2	3	2	2	0	0	1	2
Standard 4 Oral Communication								
Outcome 4.1 Identify and analyze the audience and purpose of any intended communication	3	3	3	3	2	2	3	3
Outcome 4.2 Gather, evaluate, select, and organize information for the communication	3	3	3	3	2	2	3	3
Outcome 4.3 Use language techniques, and strategies appropriate to the audience and occasion	3	3	3	3	2	2	3	3
Outcome 4.4 Speak clearly and confidently, using the voice, volume, tone, and articulation appropriate to the audience and occasion	3	3	3	3	2	2	3	3
Outcome 4.5 Summarize, analyze, and evaluate oral communications and ask coherent questions as needed	3	3	3	3	2	2	3	3
Outcome 4.6 Use competent oral expression to initiate and sustain discussions	3	3	3	3	2	2	3	3
Standard 5 Critical Thinking								
Outcome 5.1 Identify and state problems, issues, arguments, and questions containing in a body of information	3	3	3	3	2	2	3	3
Outcome 5.2 Identify and analyze assumptions and underlying points of view relating to an issue or problem	3	3	3	3	0	0	3	3
Outcome 5.3 Formulate research questions that require descriptive and explanatory analyses	0	2	0	0	0	0	0	0
Outcome 5.4 Recognize and understand multiple modes of inquiry, including investigative methods based on observation and analysis	1	3	3	3	0	0	3	1
Outcome 5.5 Evaluate a problem, distinguishing between relevant and irrelevant facts, opinions, assumptions, issues, values, and biases through the use of appropriate evidence	0	3	3	3	2	2	1	1
Outcome 5.6 Apply problem-solving techniques and skills, including the rules of logic and logical sequence	3	3	3	3	2	2	3	3
Outcome 5.7 Synthesize information from various sources, drawing appropriate conclusions	3	3	3	3	2	2	3	3
Outcome 5.8 Communicate clearly and concisely the methods and results of logical reasoning	3	3	3	3	2	2	3	3
Outcome 5.9 Reflect upon and evaluate their thought processes, value system, and world views in comparison to those of theirs	3	3	3	3	2	2	3	3
Standard 6 Creativity								
Outcome 6.1 Generate responses to problems and challenges through intuition and non-linear thinking	2	2	1	1	1	1	1	1
Outcome 6.2 Explore diverse approaches to solving a problem or addressing a challenge.	3	3	3	2	1	1	2	2
Outcome 6.3 Engage in activities without a preconceived purpose	0	0	0	0	0	0	0	0
Outcome 6.4 Apply creative principles to discover and express new ideas.	2	0	0	0	2	2	3	3
Outcome 6.5 Demonstrate the ability to trust and follow one's instincts in the absence of external direction	2	0	0	0	0	0	1	1
Outcome 6.6 Build upon or adapt the ideas of others to create unique expressions or solutions	2	1	0	2	0	0	2	2