**EGR120 Introduction to Engineering Design**

**Dental Composites**

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| Stage 1 Desired Results |
| Established GoalsCourse Objectives:* Describe and apply the steps of the engineering design process.
* Demonstrate ability to solve an engineering problem.

College-wide Core Competencies: * Scientific Reasoning - Applying logic and the scientific method to interpret observable evidence.
* Quantitative Reasoning - Applying mathematical concepts appropriately to analyze and interpret quantitative information.
* Communication - Using listening, speaking, reading, writing and visual communication skills effectively
* Information Literacy - Recognizing when information is needed and locating, evaluating, and using information appropriately.
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| Understandings*Students will understand that:** Materials are characterized by certain quantities, such as modulus of elasticity, which relate to properties of the material.
* Composite materials have certain properties that make them well-suited for certain applications.
* Researchers continue to look for better ways to apply principals in applications.
* The skills they’re learning in this class have interesting and important application in the “real” world.
 | Essential Questions* How do you find or compute stress, strain, and modulus of elasticity?
* What is the definition of a composite material?
* Why are improved dental composites needed?
* What are the important characteristics for a dental composite?
* What are the constraints and criteria for choosing a dental composite?
* What tests and analysis would you perform to determine acceptability of a dental composite material?
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| *Students will know:** Key terms: Composites, stress, strain, modulus
* The design process can be applied to many situations, including design of new and improved dental composites.
 | *Students will be able to:** Define the following terms: stress, strain, elastic modulus, and composite
* Describe how the design process is applied to designing better dental composites
* Determine the modulus of elasticity of a material in two ways: (1) mathematically given values of stress and strain; (2) from a graph of stress vs. strain
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| Stage 2 – Assessment Evidence |
| Performance Tasks* Class discussion of material properties
* Small group design task
* Assignment: Students will solve homework problems
 | Other Evidence* Weekly quiz
* Unit exam
* In-class discussion
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| Stage 3 – Learning Plan |
| 1. Students complete related reading assignment prior to class.
2. <http://www.youtube.com/watch?v=iX-tOk9iAWM>
3. Introduce the essential questions and describe the activities that will be done.
4. Define stress, strain, and modulus of elasticity (Young’s modulus)
5. Show and discuss examples of stress-strain curves.
6. Demonstrate solving problems for modulus of elasticity.
7. Do examples of finding modulus of elasticity.
8. Present material that describes composite materials.
9. Describe dental composites project.
10. Ask students think of important characteristics for dental composite materials.
11. Ask students to develop constraints and criteria for a dental composite
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