

2011-12 RET Program
Curriculum Element Description
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1. Target Audience

Class: ENES120, Statics

Students: First-year engineering students

2. Curriculum Element Goals

- a. Established Goals
 - i. HCC initiative: oral presentations in STEM curriculum
 - ii. Personal initiative: Design across the engineering curriculum
 - iii. Course objectives:
 1. Sketch the free-body diagram of a rigid body in equilibrium.
 2. Solve for unknown forces acting on a rigid body.
 3. Determine the forces in members of a simple truss.
 4. Determine the forces in members of frames and machines.
- b. Understandings
 - i. Eng design requires both creativity and technical/analytical ability.
 - ii. Design problems have many valid solutions.
 - iii. Uncertainty and assumptions are key elements of eng design.
- c. Essential Questions
 - i. How does an engineer generate design concepts and compare/evaluate concepts?
 - ii. How is structural analysis used to justify a design concept?
 - iii. What uncertainties are faced in realistic problems?
 - iv. What is a “reasonable” assumption? Unreasonable?
- d. Students will know...
 - i. the steps in the structural design process
 - ii. the important role of requirements in eng design
- e. Students will be able to...work effectively in teams to...
 - i. generate and compare design concepts
 - ii. perform structural analysis, using statics principles
 - iii. communicate technical justification, both written and orally

3. Curriculum Element Description

The curriculum element designed to meet the above goals is a structural design project, to be completed in teams of 2-4 students. Students are given 6-7 weeks to design a truss bridge to satisfy requirements and constraints specified by the assignment. Student teams function as engineering design firms responding to an RFP from a railroad company. The railroad needs a

bridge to span a ravine (site drawing is provided to students). Students work with their team, and compete with other teams, to design a bridge that is structurally sound, statically determinate, and cost-effective. Each team develops a structural analysis report and presents their final design at the end of the project.

For more details, see the assignment (separate document).