

**CEE 621**  
**Bridge Design**

- Catalog data:** 20-CEE-621. Bridge Engineering. 3 ug./gr. cr. Covers basic bridge engineering. Topics include substructures, abutments, steel, concrete and prestressed concrete superstructures. Both AASHTO standard specifications and LRFD will be covered.
- Prerequisites:** 20-ENFD-375 Basic Strength of Materials, 20-CEE-381 Structures I, 20-CEE-382 Structures II, 20-CEE-482 Reinforced Concrete Design.
- Textbook:** *“PCI Bridge Design Manual”*
- References:** *AASHTO Standard Specifications*, 17<sup>th</sup> Ed.; AASHTO LRFD Specifications, 2<sup>nd</sup> Ed. + Interims.
- Coordinator:** Richard A. Miller, Associate Professor, 732 ERC, 556-3744, Richard.Miller@UC.EDU
- Goals:** This course teaches basic principles of bridge design. Because Ohio and surrounding states have not yet migrated to the LRFD Specification, both LRFD and Standard Specifications are taught.
- Lecture or lab topics:** Bridge Codes - *AASHTO Standard Specifications and AASHTO LRFD*  
Loads and load combinations  
Prestressed concrete basics  
Prestressed box girder bridge – single span – *Std. Specs.*  
Prestressed bulb “T” – continuous for live load – *LRFD Specifications*  
Slabs  
Steel girder bridges
- Computer usage:** CONSPAN is used for bridge design.
- ABET criterion 3:** c, e, k
- ABET criterion 8:** e
- Date prepared:** November 11, 2003  
Last Update April 25, 2007

### **Specific Examples of ABET Criterion 3**

c: The entire course concerns design of specific bridge components.

e: Precast/prestressed concrete beams must be designed to meet three criteria – ultimate strength, service load stresses and release stressed. Frequently, beams are overstressed at the top in tension at release. There are several options available to remedy this: Use of tension steel, debonding of strand, harping of strands and use of top strands. Choice of solution requires the evaluation of many, often conflicting factors. For example: Harping tends to even out the stresses in the beam, but some fabricators do not have the equipment to harp. Debonding is easy and any fabricator can do it, but this method tends to cause stress concentrations and cracking. Use of tension steel, where the top of the beam may be allowed to crack, is not acceptable in cases where the beam is exposed to salt, chemicals or weather. Finally, students must determine if the choice of any method affects the beam performance at ultimate strength or working stress limit states.

k: Students do a final project where they design a complete bridge superstructure. While some hand calculations are required to show they understand concepts, the entire design is actually done using CONSPAN – the most up-to-date design software available.

### **Specific Examples of ABET Criterion 8**

e: Because of his research work, the instructor, Dr. Miller, has worked with the American Association of State Highway and Transportation Officials (AASHTO) Standing Committee on Concrete Bridges T-10. Recently, some of Dr. Miller's research was adopted into the *AASHTO LEFD Specification* and he has items pending before the committee. Based on this experience, Dr. Miller discusses how the bridge codes are written, amended and modified. There is a discussion of how the engineering profession gets input to the code writing process and the barriers to making changes in the codes.