1. CEE 4380 (5380) – Bridge Design

2. Course credit hours: 3
   Contact hours per week: 3
   Credit category: Engineering Topics (Significant Design)

3. Course coordinator: Tim Huff

4. Textbook: AASHTO LRFD Bridge Design Specifications, 8th edition (accessed via Knovel)

   Supplemental materials:
   a. PDF course notes from Dr. Huff
   b. LEAP Bridge Design Software

5. Course information:

2020 Catalog description	Design of structural steel and concrete bridges.
Prerequisite(s)	CEE 4310
Course type	Selected Elective

6. Course instructional outcomes:

Course Outcome No.	Course Outcome (CO)	ABET Student Outcome
CO1	Identify primary bridge components and types	1, 4
CO2	Apply LRFD principles to determine load and resistance of bridge elements	1
CO3	Define the HL-93 design live load in the AASHTO LRFD Specification	1
CO4	Determine the live load distribution factor for a bridge girder	1
CO5	Describe how distribution factors are used in line-girder analysis	1
CO6	Determine the seismic design category for a given bridge site	1
CO7	Calculate wind, thermal, stream flow, braking force, centrifugal force and basic earthquake loads on a bridge substructure	1, 4
CO8	Perform flexural design computations for a welded steel girder bridge	1, 2, 4
CO9	Perform flexural design computations for a prestressed concrete girder bridge	1, 2, 4
CO10	Identify foundation systems used for bridges	1

ABET criterion 3 Student Outcomes addressed by this course:

SO No.	Student Outcome (SO)
3.1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

3.2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3.4	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

7. Course topics:
   1. Introduction (5%)
   2. Bridge Elements and Loads (20%)
   3. Prestressed Girder Mechanics (10%)
   4. Plate Girder Mechanics (10%)
   5. Live Load Distribution (5%)
   6. Bearing Design (10%)
   7. Fatigue Concepts (10%)
   8. Modeling Bridge Structures Using LEAP (25%)
   9. Bridge Foundations (5%)

   Program criteria (curriculum) addressed by this course:
   1. Apply knowledge of mathematics through differential equations, calculus-based physics, chemistry, and at least one additional area of basic science, consistent with the program educational objectives
   2. Apply knowledge of four technical areas appropriate to civil engineering
   3. Design a system, component, or process in more than one civil engineering context

8. Additional topics, assignments, or requirements for dual-level (4000/5000) course:
   5000 level students are required to perform field splice design research and calculations.

9. Date: 01/16/2020