1. *Course number and name*
   ENGR 425: Reinforced Concrete Structures

2. *Credits and contact hours*
   3 credit hours; three 50-minute lecture sessions/week, or two 1-hr-15-minute lecture sessions/week, depending on semester

3. *Instructor's or course coordinator's name*
   Instructor: Zhaoshuo Jiang, Professor of Civil Engineering

   Course coordinator: Zhaoshuo Jiang, Professor of Civil Engineering

4. *Text book, title, author, and year*
   McCormac, Jack C. and Brown, Russell H., Design of Reinforced Concrete, 10th Edition, Wiley, 2014, ISBN: 978-1-118-12984-5.

   a. *other supplemental materials*
      Building Code Requirements for Structural Concrete (ACI 318-11) and Commentary (ACI 318R-11). American Concrete Institute, 2011, ISBN: 978-0-87-031744-6.

      Minimum Design Loads for Buildings and Other Structures, ASCE/SEI 7-10, American Society of Civil Engineering, 2010, ISBN: 978-0-78-441085-1.

      Wight, James K. and MacGregor, James G., Reinforced Concrete: Mechanics and Design, Sixth Edition, Prentice Hall, 2011, ISBN: 978-0-13-217652-1.

      PCA Notes on ACI 318-08 Building Code Requirements for Structural Concrete, Portland Cement Association, Skokie, IL, 2008.

5. *Specific course information*
   a. *brief description of the content of the course (catalog description)*
      Design of reinforced concrete structural systems. Elements of systems include beams, slabs, columns, footing and connections. Emphasizes Ultimate Strength approach to safety and serviceability considering bending, shear, and axial loads. The mechanics of reinforced concrete. Material behavior of reinforced concrete. Principles of design process of reinforced concrete structures. Design Building Codes, specifically ACI Code.

   b. *prerequisites or co-requisites*
      ENGR 323: Structural Analysis

   c. *indicate whether a required, elective, or selected elective course in the program*
      Elective for Civil Engineering

6. *Specific goals for the course*
   a. *specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.*

- The student will demonstrate a knowledge of mechanics of reinforced concrete.
- The student will demonstrate a knowledge of reinforced concrete behavior when subjected to bending, axial load and torsion.
- The student will demonstrate a knowledge of whether optimum design has been achieved.
- The student will demonstrate a knowledge of design procedures for reinforced concrete structures.
- The student will demonstrate a knowledge of the design method: Ultimate Design Method. The student will demonstrate knowledge of the design of columns.
- The student will demonstrate knowledge of the design of beams.
- The student will demonstrate a knowledge of the design of reinforced concrete slabs.
- The student will demonstrate a knowledge of the design of footings.
- The student will demonstrate skill in solving practical engineering problems through project assignments.
- The student will demonstrate an understanding of the design building codes and the background of codes.
- The student will demonstrate skill in applying codes and specifications to design reinforced concrete structural members.

   b. *explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.*
   Course addresses ABET Student Outcome(s): a, c, e, i, k.

7. *Brief list of topics to be covered*
- Footings
- Structural Design Process and Principles.
- Structural Load Paths
- Reinforced Concrete Behaviors and Properties.
- Flexure: Beams
- Flexure: T Beams
- Shear in Beams
- Development, Anchorage, and Splicing of Reinforcement
- Serviceability
- Continuous Beams
- One-way Slabs
- Columns: Combined Axial Load and Bending
- Slender Columns
- Footings
- Professional Software: S-Frame Suite