1. **Course number and name**  
   **ENGR 235: Surveying**

2. **Credits and contact hours**  
   3 credit hours; two 50-minute lecture sessions and one 150-minute laboratory session/week

3. **Instructor’s or course coordinator’s name**  
   Instructor: Ghassan Tarakji, Professor of Civil Engineering  
   Course coordinator: Ghassan Tarakji, Professor of Civil Engineering

4. **Text book, title, author, and year**  

   a. **other supplemental materials**  

5. **Specific course information**  
   a) **brief description of the content of the course (catalog description)**  
      Surveying: distance, elevation, and direction measurements; traverse analysis; contours; topography; areas calculations. Introduction to GPS and GIS. The US public lands system.

   b) **prerequisites or co-requisites**  
      **ENGR 100:** Introduction to Engineering  
      **MATH 226:** Calculus I (Graphs. Differentiation: theory, techniques, and applications. Integration: Fundamental Theorem of Calculus and applications. Transcendental functions)

   c) **indicate whether a required, elective, or selected elective course in the program**  
      Required 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.**  
      • Students will demonstrate an understanding of the tools and applications of surveying in civil engineering and construction.  
      • Students will demonstrate an understanding of gross, systematic, and random errors.  
      • Students will demonstrate that they are able to perform distance measurements and to perform the necessary corrections to these measurements.  
      • Students will demonstrate that they are able to perform elevation measurements and to perform the necessary corrections to these measurements.  
      • Students will demonstrate that they are able to perform direction measurements and to perform the necessary corrections to these measurements.  
      • Students will demonstrate the ability to calculate the area of a traverse.
• Students will demonstrate that they can perform traverse analysis and corrections.
• Students will demonstrate an understanding of the concepts of GPS and GIS, and the applications of these two systems in the practice of surveying.
• Students will demonstrate an understanding of the US Public Lands System.
• Students will demonstrate their ability to complete a project that includes both surveying data collection and computations.

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): [list outcomes by letter].
N/A

7. Brief list of topics to be covered (Tentative)
• Introduction and background
• Distance measurement and correction
• Differential and profile leveling
• Angles and directions
• Traverse analysis
• Contours and topography
• Area calculations
• Introduction to GPS
• Introduction to GIS
• U.S. public lands system
• Project

Brief list of laboratory experiments to be covered (Tentative)
• Swift Measurements (pacing and rolling wheel) and referencing points
• Stadia distance measurement
• Precise taping
• Leveling along a loop
• Profile leveling
• Closing the horizon using the theodolite
• Measurement of interior angles using the theodolite
• Traverse measurements using total station
• Staking out points using total station
• Traverse analysis