1. **Course Number and Name:** CE 4332 – Construction Methods: Field Operations
2. **Credits and Contact Hours:** 3 Credits
3. **Instructor’s Name:** Dr. Mohammad Najafi, P.E.
4. **Recommended Textbook**


5. **Specific Course Information:**
   a. Introduction to the methods, equipment, and management techniques used in the construction industry. Topics include equipment operating characteristics, job site safety, and field management
   b. Prerequisite: CE 3343 with a C or better or permission of instructor.
   c. Required or Elective Course: Elective

6. **Specific Goals for the Course:**
   a. General outcomes
      As a result of successfully completing this course, the student will be able to:
      a) An ability to apply knowledge of mathematics, science, and engineering,
      b) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability,
      c) An ability to identify, formulate, and solve engineering problems,
      d) An understanding of professional and ethical responsibility,
      e) An ability to use the techniques, skills and modern engineering tools necessary for engineering practice,
      f) Understand different construction methods and application of equipment in construction,
      g) Be able to preplan construction activities involving different construction equipment,
      h) Estimate productivity and cost of construction equipment,
      i) Plan construction equipment,
      j) Understand major methods of heavy construction related to soil work, asphalt, and concrete,
      k) Understand equipment economics, and
      l) Acquire basic knowledge of equipment safety.

   b. Student outcomes from ABET EAC Criterion addressed in this course

      1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science and mathematics.
      5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
      6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. **List of Major Lecture Topics**

- Evaluation of equipment costs using capital costs, and operation and maintenance costs by present value, annual value and future value concepts. Pre-Estimate Activities Estimating Process.
- Planning of earthwork using mass haul diagram, selection of equipment, haul directions.
- Overview of different types of soils and rocks, their quality, workability and densities.
- Importance of compaction and stabilization, equipment used for compaction, calculation of productivity of rollers and optimum number of rollers for compaction operations.
- Machine power required at different field conditions like slope, soil, etc.
- Overview of different types of dozers used in construction, calculation of productivity and cost of activity using dozers.
- Overview of different types of scrapers used in construction, calculation of productivity and cost of activity using scrapers.
- Overview of different types of trucks used in construction.
- Overview of different types of dozers used in excavators, calculation of productivity and cost of activity using excavators.
- Calculation of productivity and cost of activity using trucks with other equipment, calculation of optimum number of equipment and trucks in a hauling crew.
- Overview of different types of graders used in construction, calculation of productivity and cost of activity using graders.
- Overview of different types of dozers used in excavators, calculation of productivity and cost of activity using graders.
- Overview of different applications and types of drilling, calculation of productivity of drilling operations.
- Overview of different applications and types of tunneling, calculation of productivity of blasting operations.
- Overview of different components of aggregate production plants.
- Different types of asphalt mix production plants and equipment. Requirements for placing asphalt concrete in road construction.
- Different types of concrete mix designs and equipment for batching, mixing and placing concrete.
- Overview of different types of cranes used in construction, calculation of productivity and cost of activity using cranes.
- Overview of different types of cranes used in construction, calculation of productivity and cost of activity using cranes.
- Overview of different types of air compressors used to operate different tools and pumps, calculation of power requirements and selection of air compressor and pumps.
- Preplanning building construction, nuisance control, safety issues in building construction.
- Overview of different types of forming systems used in construction, calculation of formwork requirements, selection of forming system, formwork economics.