1. **Course number and name**  
   **ENGR 848: Design VLSI Design**

2. **Credits and contact hours**  
   3 credit hours; one 2-hour-45-minute lecture sessions/week

3. **Instructor’s or course coordinator’s name**  
   Instructor: Hamid Mahmoodi, Assistant Professor of Computer Engineering  
   Course coordinator: Hamid Mahmoodi, Assistant Professor of Computer Engineering

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

   a. **other supplemental materials**  
      (none)

5. **Specific course information**  
   a. **brief description of the content of the course (catalog description)**  

   b. **prerequisites or co-requisites**  
      ENGR 453 or equivalent

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

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 be able to describe fundamental metrics used for quantitative evaluation of a design  
      - The student will be able to explain basics of MOS transistors and CMOS technology  
      - The student will be able to describe silicon technology scaling and trends  
      - The student will be able to design using different logic styles such as complementary CMOS logic, pass-transistor logic, dynamic logic, etc  
      - The student will have the skills of transistor-level analysis and design of simple and complex logic gates such as inverter, NOR and NAND gates  
      - The student will be able to explain different memory elements and design sequential logic circuits such as latches and flip-flops  
      - The student will be able to consider the role of interconnects in IC design  
      - The student will be able to design arithmetic functional units such as adders and multipliers
• The student will be able to design memory (SRAM and DRAM)

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, b, c, d, e, g, i, j, k.

7. Brief list of topics to be covered
• Introduction to digital integrated circuits
• Design metrics
• MOS transistor
• CMOS technology
• CMOS inverter
• Interconnects
• Combinational logic gates in CMOS
• Design of sequential logic circuits
• Arithmetic building blocks
• Memory design