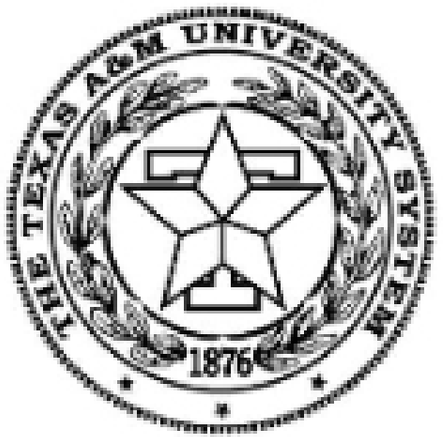
# ECEN 449 – Microprocessor System Design




## FPGAs and Reconfigurable Computing

Some of the notes for this course were developed using the course notes for ECE 412 from the University of Illinois, Urbana-Champaign

# Objectives of this Lecture Unit

- Get a feel for the different technologies that can be used to implement a design
  - Flavors of hardware technologies
  - Flavors of implementation methods
- Understand the basics of how FPGAs work
  - So that the CAD tools in the lab make sense to you

# Software, Custom Hardware or Reconfigurable Hardware?

- When should we use software, "custom" hardware, or reconfigurable hardware?
- Software based systems are easiest to implement
  - But there is a huge performance gap between software and hand-designed (custom) hardware systems
  - Often 100-to-1 ratio of performance (speed) or performance/area
- But custom hardware systems not so good for general computing
  - Big design effort (time, cost) are barriers to implementation
  - Not practical to buy a new machine every time you want to run a different program
- Reconfigurable systems offer best-of-both-worlds
  - Run-time programmability (in the field)
  - Hardware-level performance (although lower than custom hardware)
  - FPGAs and CPLDs are the vehicles for reconfigurable systems.