**ECEN 4303 Digital Integrated Circuit**

**Chapter 2: The Two-Terminal MOS Structure**

* Flatband Voltage
  + - is work function potentials of body (semiconductor substrate)
    - is work function potentials of gate (metal material)
  + Potential drop across oxide
    - * Oxide capacitance per unit area,
  + Equivalent oxide thickness (EOT)
    - If an insulator is made out of a single material, EOT would be
  + Flatband voltage,
* Effect of Gate-Body Voltage on Surface Condition
  + Flatband Condition
  + Accumulation
  + Depletion and Inversion
    - Depletion
    - Inversion
    - Carrier Concentration
* General Analysis
* Accumulation and Depletion
  + As long as   
    - Deep in accumulation ( by several )
    - Deep in depletion ( by several )  
        
       (This can solved explicitly for )
  + Surface potential obtained deep in depletion  
    - This equation can plot graph surface potential versus for region accumulation, depletion, and weak inversion (between and .
* Inversion
  + General relations and regions of inversion  
      
    - Charge sheet approximation
    - In pure depletion region
    - Depletion approximation
    - General equation for depletion approximation
    - Gate-substrate voltage vs surface potential
  + Strong inversion
    - ,
  + Weak inversion
* Small-signal Capacitance