**ABE 557 F2018**

**Fermenter Design Problem**

**Develop and algorithm and design a batch fermenter system to continuously produce 100 #DS/hr. of a yeast product.**

**A. Due 3 Sep: Determine the time required/batch and the size of the vessels,**

**B. Due 10 Sep: the power and type of agitator, the size and flow of heat exchanger, amount of air flow, and the size and power requirement of blower.**

**State and provide references for all assumptions, constants and equations. Do own work. Give thought to results to insure that they are reasonable.**

**Assume filling time plus fermentation time equals emptying time.**

**Use report format and submit results in graphical or tabular. Include the design procedure (algorithm) in a detailed systematic manner, completed with full equations, sample calculations with labeled variables with units. Include commented Matlab program. Keep all parameters as variables so that the effect of the parameters can be quantitatively determine the effect on the output. Please demonstrate the effect of changing agitation speed, and air flow rate on system design.**

**dX/dt= uX Where u=(umax)(S)/(Ks+S)**

**AS A STARTING POINT:**

**Ks = .25 g/l So = 0.2g/g umax = 0.5 /hr. Yx/s = 0.5**

**Each batch utilizes 95% of So.**

**The critical O2 concentration ---Cl crit = 1.5mg/l Temp is 30C**

**90% of the yeast is removed after each batch and 10% remains for the next run.**

**Q kcal/h = 0.12 Q mmoles O2/h Respiration rate 8 mmol O2/g dw-hr**