



**CDB 4313Z – HEAT INTEGRATION**  
**PROCESS INTEGRATION II**  
**APPROPRIATE PLACEMENT OF REACTORS**

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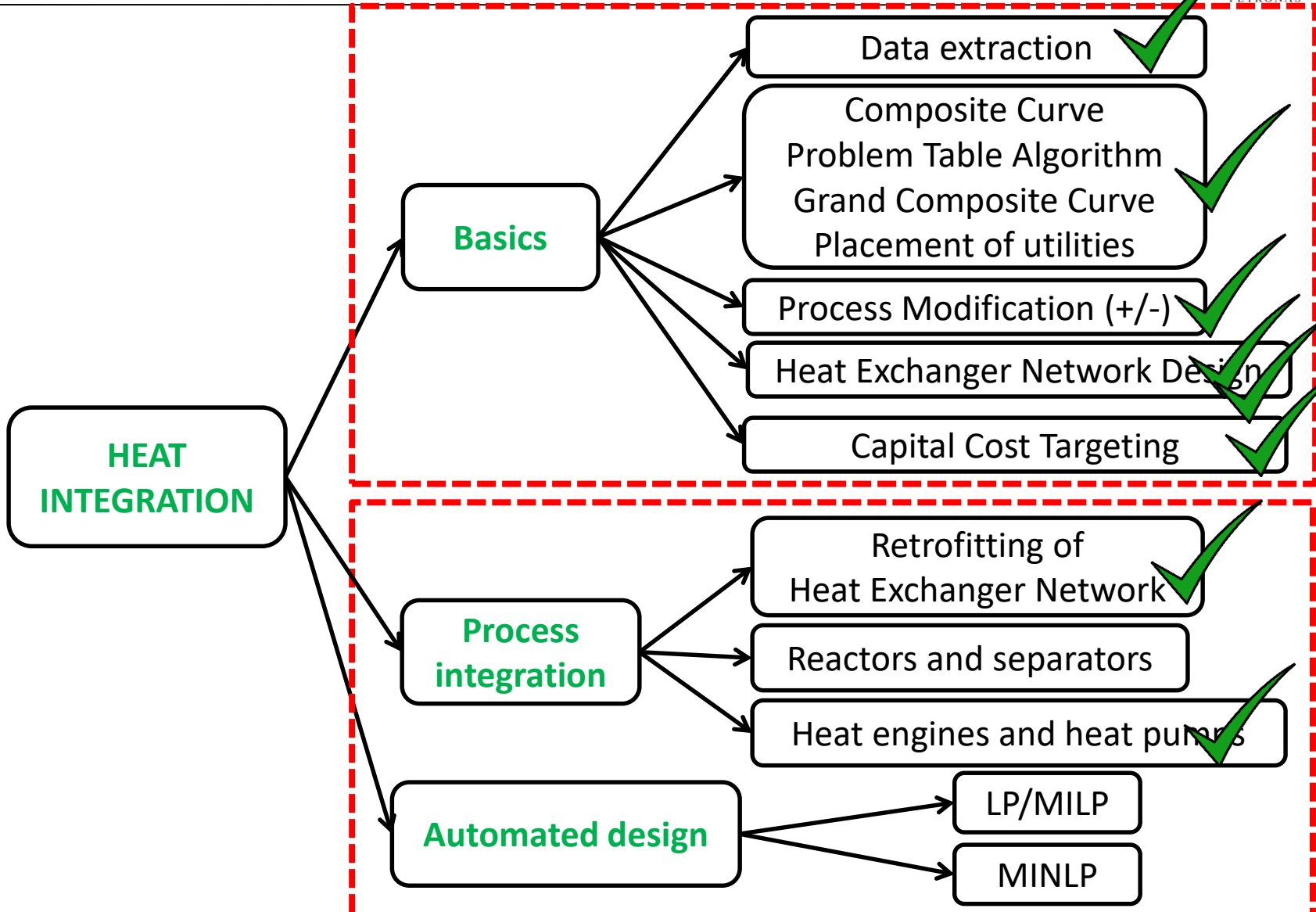
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Discussion time: Friday 15.00 – 17.00

Chemical  
Engineering

Inspiring Potential · Generating Futures

# COURSE OVERVIEW



# COURSE LEARNING OUTCOMES

At the end of this course, students shall be able to:

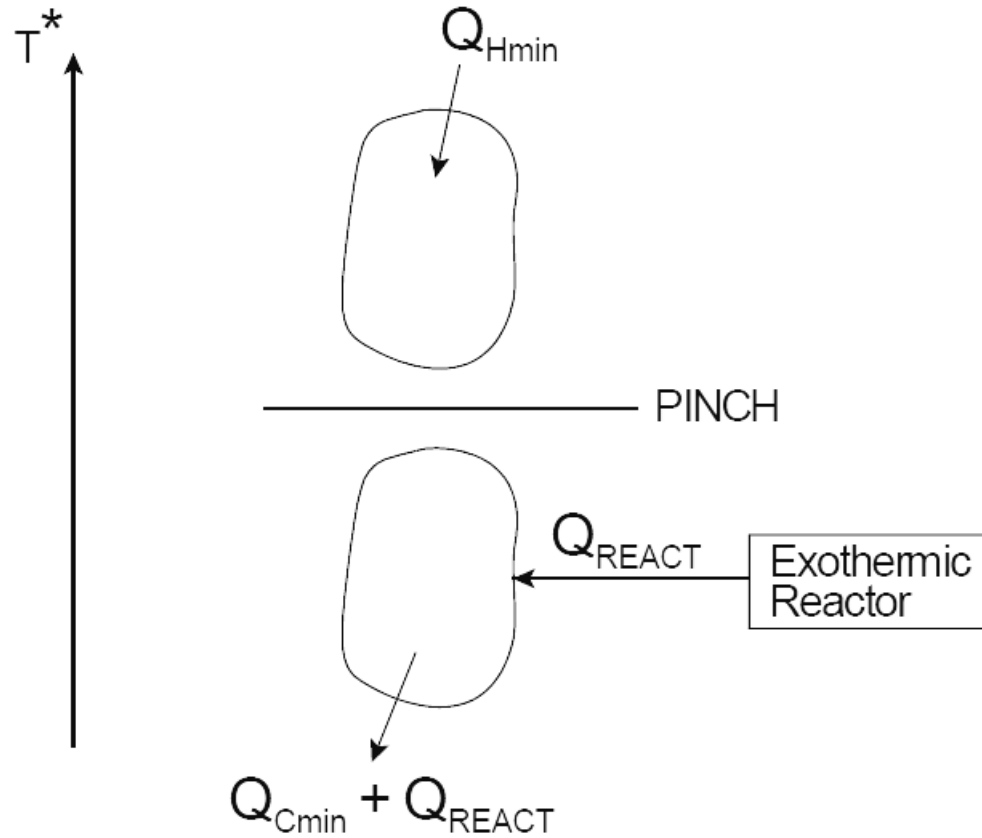
1. Perform **targeting exercise** to determine the minimum utility requirements and maximum heat recovery possible for a process using composite curve or problem table algorithm
2. **Design heat exchanger network** for achieving maximum energy recovery or minimum total cost using pinch analysis technique
3. **Apply pinch analysis software** to perform heat integration and heat exchanger network design that is cost competitive and taking into account of sustainability factors
4. Analyze the **potential for heat and power integration** of a process and the possible implementation options, and to screen the options using cost effective strategy
5. Perform **correct data extraction** from process flowsheet for the purpose of performing pinch analysis

# OPENING QUESTIONS

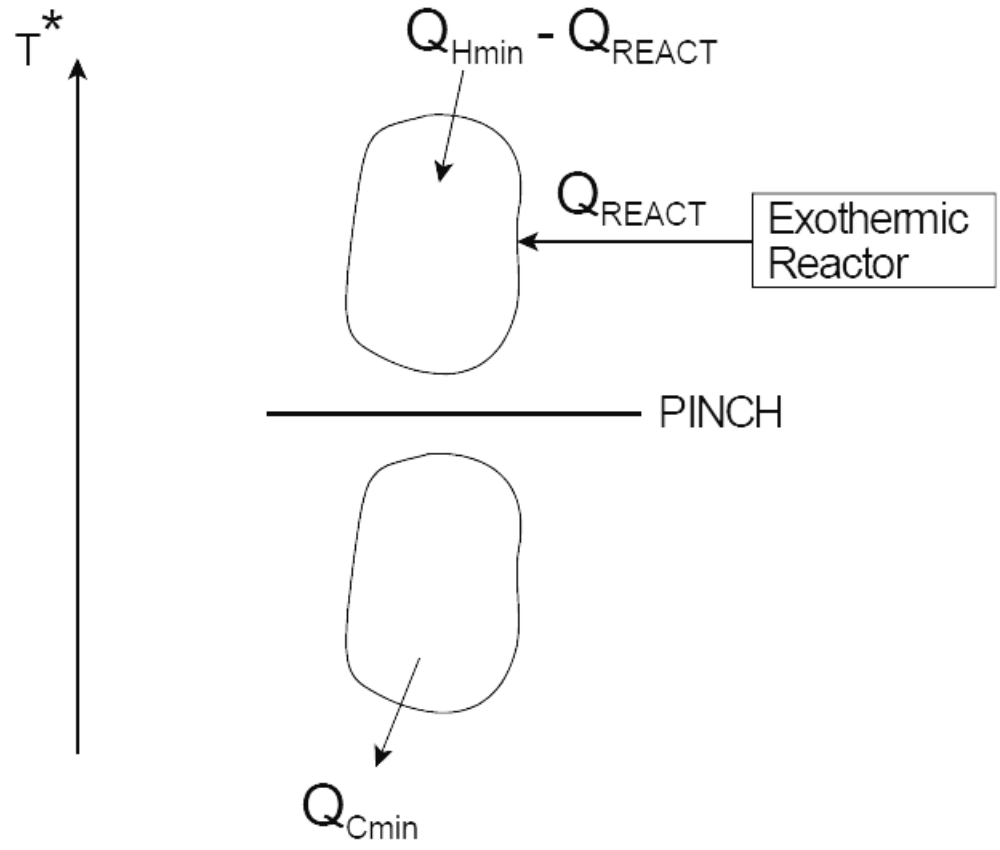
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- What is exothermic reaction?
- What is endothermic reaction?
- What is energy activation?
- What is the general equation for 1<sup>st</sup> order reaction?

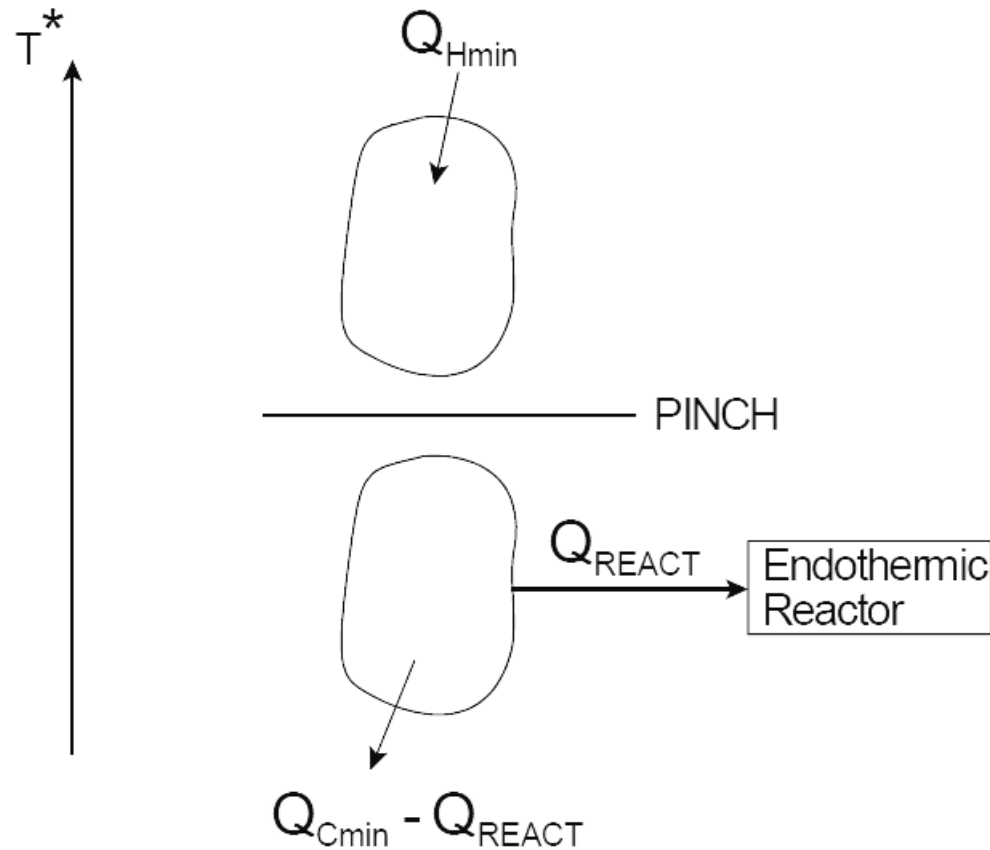
# EXOTHERMIC REACTIONS – BELOW PINCH



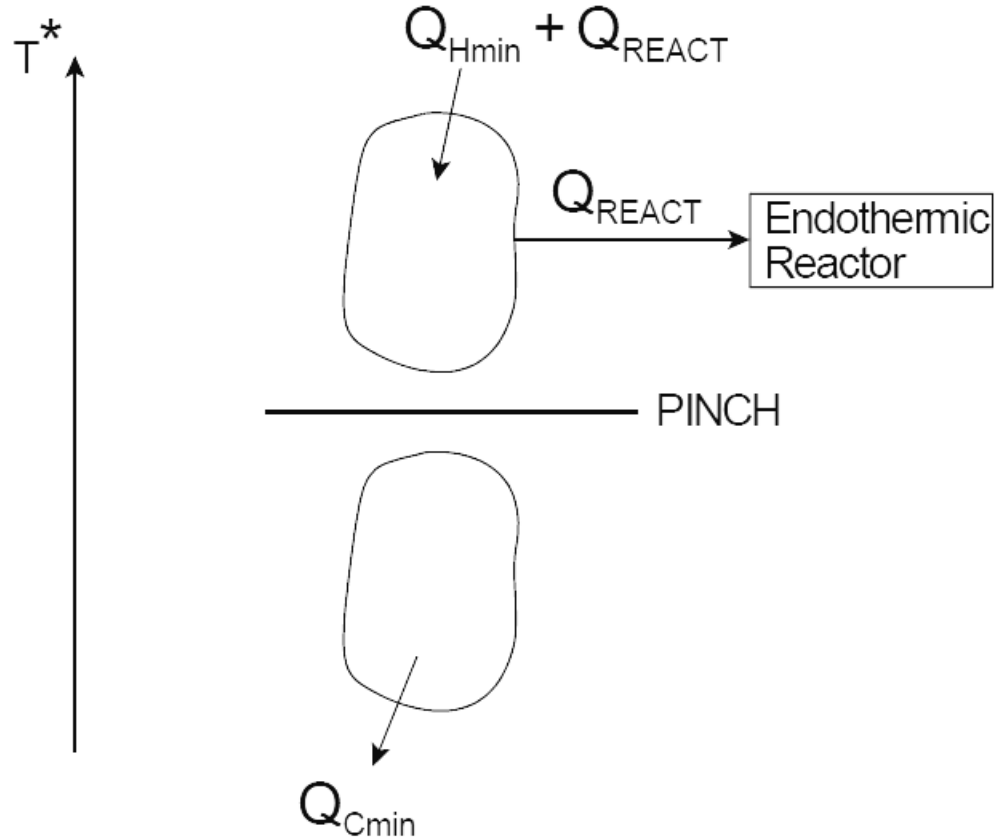
# EXOTHERMIC REACTIONS – ABOVE PINCH



# ENDOTHERMIC REACTIONS – BELOW PINCH



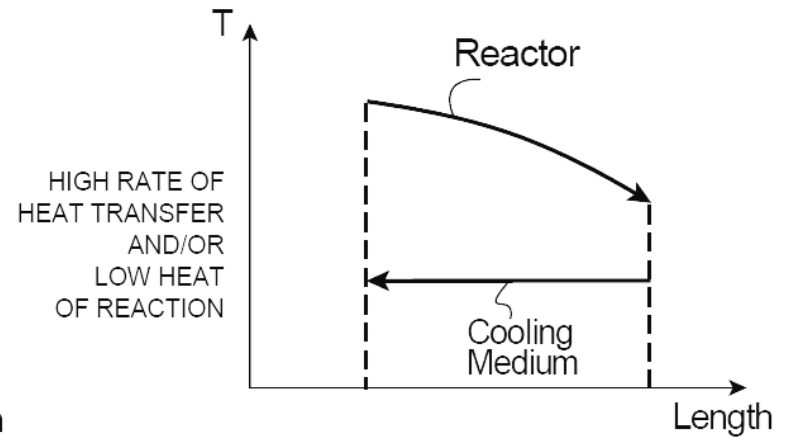
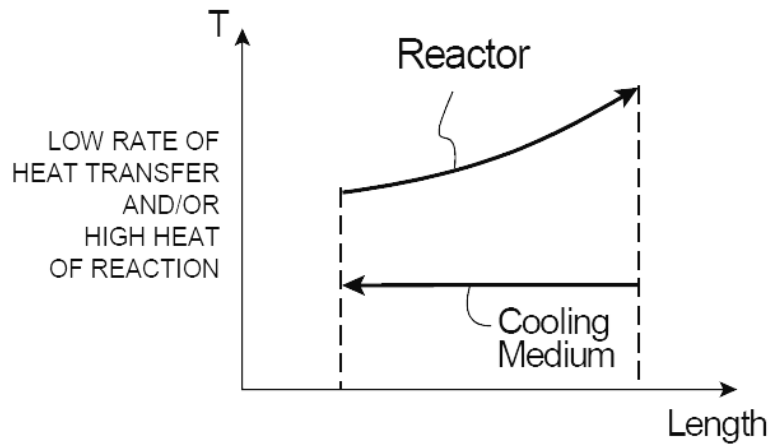
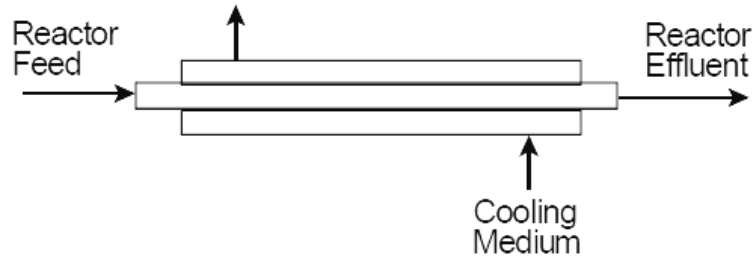
# ENDOTHERMIC REACTIONS – ABOVE PINCH





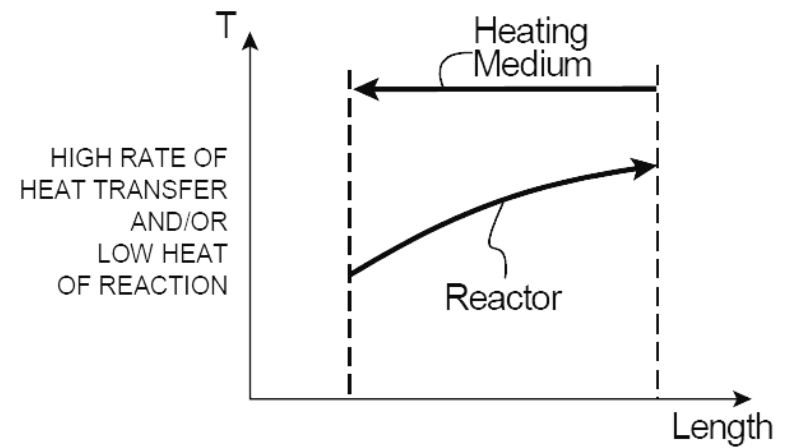
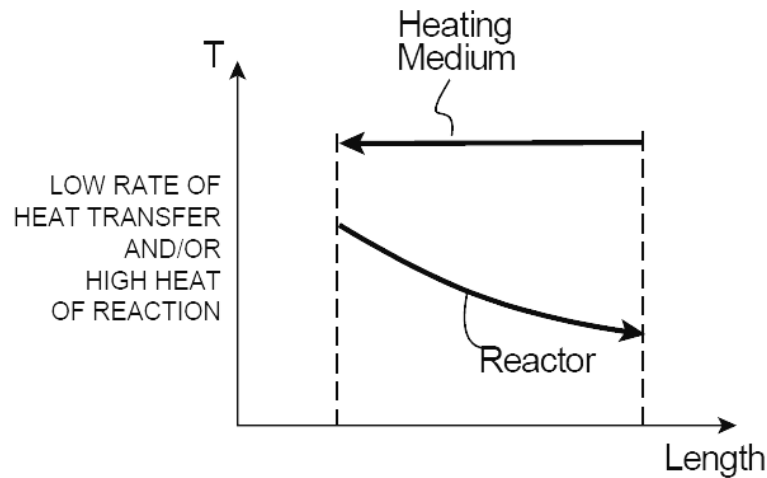
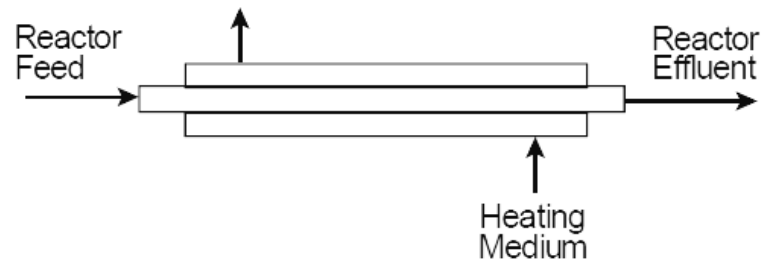
# REACTOR THERMAL CHARACTERISTICS

## Exothermic reaction



# REACTOR THERMAL CHARACTERISTICS

Endothermic reaction



# GROUP WORK

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From your PDP case,  
Please locate the location of your reactors in the GCC  
Can you change your reactor operating condition  
to reduce the hot utility?

# COURSE OVERVIEW

