
aka The Engagement Deck

Engineering &
Computer Science
Syracuse University

# Using The Engagement Deck

- Syllabus statement
- Explanation + demo on first day
- Counts in final grade  grade bump at cut-off vs. 5%
- Consistent + strategic implementation
  - I average 7-8 questions/class
  - Difficult or new material → volunteers
  - Small group discussions before questions
  - Less threatening question formats
  - Checking in with “on deck”
  - Push on an “I don’t know”

This semester Dr. Cadwell will use a deck of cards in which everyone's name appears once to enhance participation from class. Because the purpose of this class is to expand upon principles learned in Mass & Energy Balances, and to further prepare for future courses in Thermodynamics, Fluids, Heat and Mass Transfer, and Reactor Design, connections constantly need to be drawn between review material and new material, to help us get a better "feel" for the underlying concepts of chemical engineering.

Frequent questions to the class, calling on whoever is the next card in the deck, is meant to provide feedback as to whether those connections are being made, and to help students stay engaged during class. They're not meant to be evaluative, and points are not awarded based upon correctness of answers.

If a question is engaged with thoughtfully, the student will earn an Engagement Point (marked on the card). Thoughtful engagement could be answering the question (correctly or incorrectly) with explanation, explaining what factors may need to be considered to answer, explaining what relevant point they are stuck on/confused about, noting a similarity to another specific problem, or indicating where specifically in our notes/in-class activities we might look for an answer.

Guessing/answering *without* explanation, passing or saying "I don't know" alone does not constitute thoughtful engagement. At the end of the semester, any student within one standard deviation on the class Engagement Point average will earn at least 4% of the 5% of the final grade attributed to Engagement & Participation.

# ABET Student Outcome 3

3. an ability to communicate effectively with a range of audiences

# Presenting technical information to non-tech audience

$G_y := 0.678 \cdot \frac{kg}{s \cdot m^2}$ $G_x := 0.678 \cdot \frac{kg}{s \cdot m^2}$ $T := (273.15 + 30) \cdot K$ $slope := 1.20$

$y_b := 0.04$ $y_a := 0.05 \cdot y_b = 2 \times 10^{-3}$ $x_a := 0$ $\frac{y_b}{y_a} = 20$ $m_y := 3000 \cdot \frac{kg}{hr}$ $P := 1 \cdot atm$

$M_y := (29 \cdot .96 + 17 \cdot .04) \cdot \frac{gm}{mole} = 0.029 \frac{kg}{mol}$ $M_x := 18 \cdot \frac{gm}{mole}$ $R_{IG} := 8.314 \cdot \frac{J}{mole \cdot K}$

$G_M := \frac{G_y}{M_y} = 23.773 \frac{mol}{m^2 \cdot s}$ $L_M := \frac{G_x}{M_x} = 37.667 \frac{mol}{m^2 \cdot s}$ $\rho_y := \frac{P \cdot M_y}{R_{IG} \cdot T} = 1.147 \frac{kg}{m^3}$

$mGmLm := slope \cdot \frac{G_M}{L_M} = 0.757$ $\rho_x := 55.27 \cdot 10^3 \cdot \frac{mole}{m^3} \cdot M_x = 994.86 \frac{kg}{m^3}$ $S_c := \frac{m_y}{G_y} = 1.229\ m^2$

$N_{Oy} := \frac{1}{1 - mGmLm} \cdot \ln\left[(1 - mGmLm) \cdot \frac{y_b}{y_a} + mGmLm\right] = 7.108$ $D_c := \sqrt{\frac{4 \cdot S_c}{\pi}} = 1.251\ m$

$u_y := \frac{G_y}{\rho_y} = 1.94 \cdot \frac{ft}{s}$ $C_s := \frac{u_y \cdot \sqrt{\frac{\rho_y}{\rho_x - \rho_y}}}{\frac{ft}{s}}$ I made this unitless for the y-axis calculation

Onda's method for packing height

assume the 1.5"Raschig rings are ceramic

water viscosity & density & surface tension and air viscosity from DIPPR

$\sigma_c := 61 \cdot 10^{-3} \cdot \frac{N}{m}$ $a := 128 \cdot \frac{m^2}{m^3}$

$x\_axis := \frac{G_x}{G_y} \sqrt{\frac{\rho_y}{\rho_x}} = 0.034$

$\sigma_L := 0.07126 \cdot \frac{N}{m}$ $K_5 := 5.23$ $d_p := 38 \cdot 10^{-3} \cdot m$ $g = 9.807 \frac{m}{s^2}$ $\mu_y := 1.869 \cdot 10^{-5} \cdot Pa \cdot s$

$a_w := a \cdot \left[1 - e^{-1.45 \left(\frac{\sigma_c}{\sigma_L}\right)^{0.75} \left(\frac{G_x}{a \cdot \mu_x}\right)^{0.1} \cdot \left(\frac{G_x^2}{\rho_x \cdot \sigma_L \cdot a}\right)^{0.2} \cdot \left(G_x^2 \cdot \frac{a}{\rho_x^2 \cdot g}\right)^{-.05}}\right] = 41.532 \frac{1}{m}$

$y\_axis := C_s \cdot F_p^{0.5} \cdot \nu^{0.05} = 0.636$

This gives a pressure drop of about 0.075 inH20/ typical design, according to McCabe Fig 18.7.

$k_L := 0.0051 \cdot \left(\frac{G_x}{a_w \cdot \mu_x}\right)^{\frac{2}{3}} \cdot \left(\frac{\mu_x}{\rho_x \cdot D_x}\right)^{\frac{-1}{2}} \cdot (a \cdot d_p)^{0.4} \cdot \left(\frac{\rho_x}{\mu_x \cdot g}\right)^{\frac{-1}{3}} = 6.921 \times 10^{-5} \frac{m}{s}$

$D_{y298} := 2.80 \cdot 10^{-5} \cdot \frac{m^2}{s}$ From Convect Binary Gaseo

$D_y := D_{y298} \cdot \left(\frac{303 \cdot K}{298 \cdot K}\right)^{1.75} = 2.883 \times 10^{-5}$

$k_G := \frac{a \cdot D_y \cdot K_5}{R_{IG} \cdot T} \cdot \left(\frac{G_y}{a \cdot \mu_y}\right)^{0.7} \cdot \left(\frac{\mu_y}{\rho_y \cdot D_y}\right)^{\frac{1}{3}} \cdot (a \cdot d_p)^{-2.0} = 1.394 \times 10^{-5} \frac{s \cdot mol}{kg \cdot m}$

$D_x := 1.969 \cdot 10^{-5} \cdot \frac{cm^2}{s}$ From Yaws' C Chemists, Tab Compunds, lo

$H_y := \frac{G_M}{k_G \cdot a_w \cdot P} = 0.405\ m$ $H_x := \frac{L_M}{k_L \cdot a_w \cdot \left(\frac{\rho_x}{M_x}\right)} = 0.237\ m$

$H_{Oy\_Onda} := H_y + mGmLm \cdot H_x = 0.585\ m$ This is only about 65% of value we got from methods in class. I'd definitely trust the specific plot more.

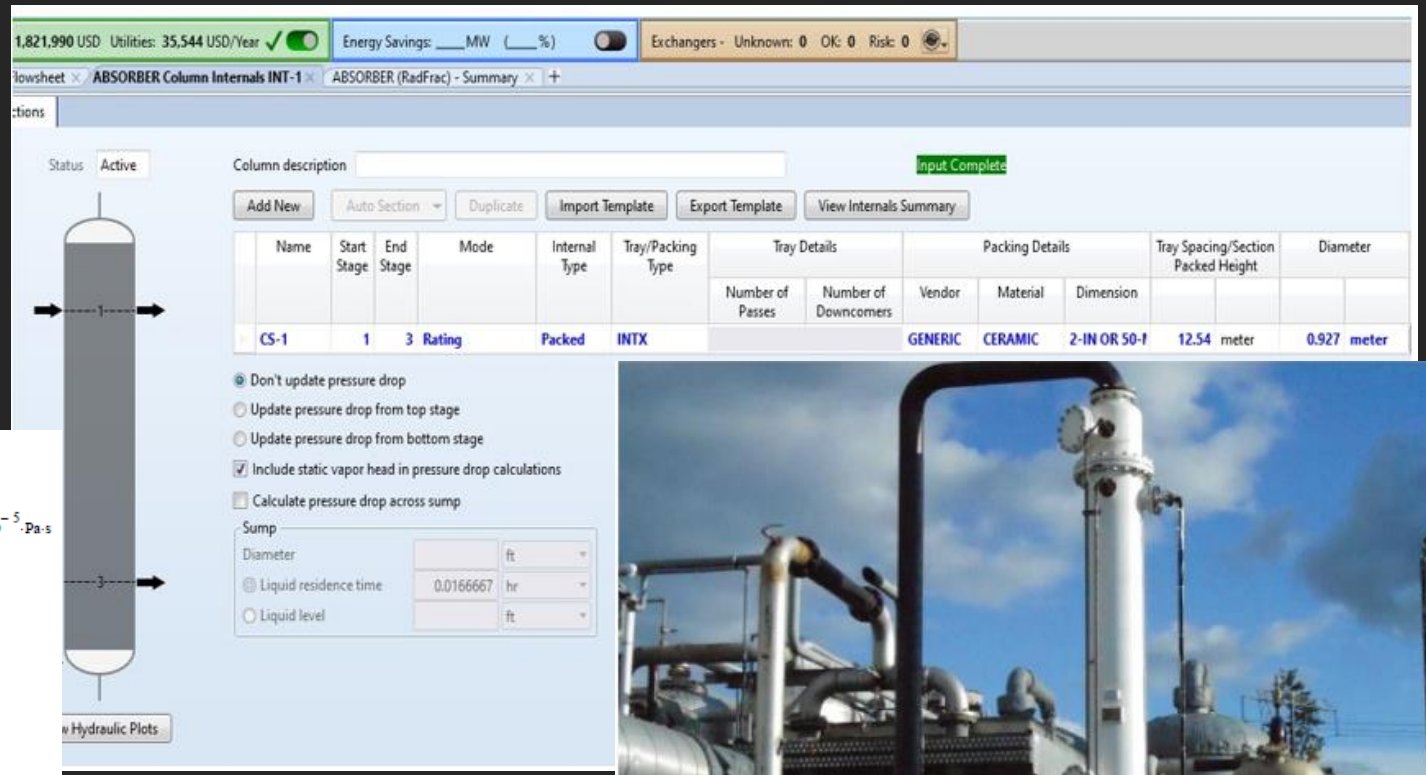
$Z_{T\_Onda} := N_{Oy} \cdot H_{Oy\_Onda} = 4.157\ m$

$\Delta p_{Onda} := Z_{T\_Onda} \cdot \Delta p_L = 0.255 \cdot kPa$

In class we got

$H_{Oy\_simple} := 0.91 \cdot m$

$Z_{T\_classexample} := H_{Oy\_simple} \cdot N_{Oy} = 6.468\ m$



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# Cross-cohort Project

- CEN 442
  - Unit operations technical design projects
  - Present to freshmen - communication goals
  - Evaluate feedback

- ECS 101
  - Final project is a slide presentation
  - Watch CEN 442 presentations & provide feedback
  - Give own presentations

# Problem Statement

- Communicating technical information to other engineers and scientists is tough enough, but frequently you're going to need to be able to present to non-specialized or even entirely non-technical audiences, whether it's engineers not familiar with the type of information you're sharing, marketing or other administrative staff, clients without technical backgrounds, or even just the general public.

- Your team will design an 8-12 minute presentation with supporting materials based upon of one of your previous design projects and present it to her ECS 101 class. You will clearly define your audience, communication goals, and a method by which to establish how effectively you met those goals upon delivering your presentation.