CBE 34487

Analysis and modeling of the great ideas of chemical engineering
(maybe) One time only: Summer 2020

Professor M. J. McCready

MJM "FAVORITES SERIES" SLIDESHOWS

- "My Favorite Chemical Engineering things"

- "My Favorite (Transport Phenomena) things"

- "Engineering Professionalism" (should be your favorite things!)

- Playlists…

  - Great fugues, Great Choral Fugues, Pop favorites, Country favorites

COURSE SYLLABUS

- <u>Great ideas of chemical engineering</u>

GREAT IDEAS

- While "interdisciplinarity" gets a lot **buzz**, the core knowledge of humankind, and thus the <u>building blocks for a sound education</u> resides largely in (well optimized and thoughtfully considered) *disciples*

- Chemical Engineering is a <u>top of the food chain</u> discipline!

GREAT IDEAS

- Staging to effective separations

- Reactor schemes to employ heterogeneous catalysts

- Transport phenomena

- Molecular thermodynamics

- Data analysis

- Dimensional analysis

"ANALYSIS"

- Each of the ideas will be cast in a framework that will allow quantitative predictions of behavior — mathematics

    - Algebraic equations

    - Ordinary and partial differential equations

    - Statistical and time-series analysis

    - More generalized modeling

  - *Mathematica* will allow this with less (fussiness)

FIRST TOPIC

- Dimensional analysis

    - How do engineers make comparisons… and thus decisions?

    - We need a common basis to measure different entities

DECISIONS

- If we have problem with different flavors of the same "substance"

  - Energy: Potential compared to kinetic

  - Forces: Ratio of inertia and viscous forces

DECISIONS

- You have a gift card… how to decide….

- ….have to wait for this one!

ANOTHER HARD CHOICE !!

TAKE THIS FURTHER

- How old are you allowed to be and still take your baseball mitt to a game? (Erik Kuselias: If you are old enough to go alone… no!)

  - Somehow the wearing of a jersey with someone else's name on it doesn't seem to have an age!

MY FAVORITE GROUP

- With a bit of youthful exuberance upon learning about dimensionless groups in 1977, Patricia Mackenzie and Mark McCready defined:

- Ratio of: *how smart you are* to *how smart you think you are* :

    - (mjm couldn't resist naming it after the POTUS of that time, Cr)

    - Which led to the exact definition of "unity": the Cr number for the next President

    - (Come to the class to see more of these and a dimensionless proverb!)

TUESDAY AND THURSDAY, 19:00 UCT-4

- Live in the evening

- Question session the following mornings

- 3 CBE elective credits

- HW sets for each module

- Really fun stuff!