Separation Processes:
Course overview
ChE 4M3

© Kevin Dunn, 2014
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http://learnche.mcmaster.ca/4M3

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*(when used without modification)*
We appreciate:

▶ if you let us know about any errors in the slides
▶ any suggestions to improve the notes

All of the above can be done by writing to

kevin.dunn@mcmaster.ca

or anonymous messages can be sent to Kevin Dunn at

http://learnche.mcmaster.ca/feedback-questions

If reporting errors/updates, please quote the current revision number: 294
Plan for today’s class

1. Background
2. Administrative issues
3. Short brainstorming session of topics to cover
4. Course content (today, and the next class also)
Credits for course material

- Dr. Santiago Faucher
  - Taught the course in 2009, 2010 and 2011
  - Course outline and topics covered are similar to his
- Dr. Raja Ghosh, taught 4M3 for a few years prior to that
- Dr. Jim Dickson, taught the course since 1984

I modified the course order and materials substantially in 2012.
Background

About myself

- Undergraduate degree from University of Cape Town, 1999
- Masters degree from McMaster, 2002 (not a “doctor”, please)
- Worked with a number of companies from 2002 to 2011 on data analysis and consulting projects
- Worked at GSK on a 1-year contract until June 2012
- Now working full-time at McMaster since July 2012
- Office is in BSB, room B105
- Arrange a meeting: kevin.dunn@mcmaster.ca
  - I will meet as soon as I am available
  - but you must email me with a time, and a short description of what you want to talk about
- Cell: (905) 921 5803
Teaching assistants

Kushlani Wijesekera
▶ chemac.4m3@gmail.com
▶ JHE, room 370
▶ Currently doing her M.A.Sc with Tom Adams
▶ Office hours to be arranged by email with her

Hermes Zhu
▶ chemac.4m3@gmail.com
▶ JHE, room A105/B
▶ Currently doing his Ph.D with Shiping Zhu
▶ Office hours to be arranged by email with him
Video and audio recordings

- As long as feasible, I will try to video record all classes
- Might be useful if you miss a class
- Most useful: review after the class
- Quality might not be the best
- Usually available 24 to 48 hours later
- Audio recordings will also be made available, when possible
Please check at least 3 times/week for announcements (top left)

Follow the Twitter feed: @4m3separations

- Slides will be added to the site before class
- Please **print slides and bring to class**
- Assignments and solutions will be posted there
- Other references/readings for enrichment
References and readings

No required textbook

Recommended: Seader, Henley and Roper, “Separation Process Principles” (3rd edition)


Recommended: Perry’s “Chemical Engineers’ Handbook”, any edition. Please make full use of the library’s subscription:


Other references on course website
Course feedback via Learning website

- I might not have explained something clearly;
- you didn’t get a chance to ask a question, etc

http://learnche.mcmaster.ca/feedback-questions
Expectations outside class

- You can expect TAs and I to answer emails promptly
- If you have questions
  1. Please email the TA with CC to me  
     hopefully this solves your problem
  2. if not, set up meeting with TA or myself
- Please email from your McMaster address (filtering)
What we look for in the grading is demonstration that you/group:

1. understand the concept
2. apply a systematic problem-solving strategy
   - Define, Explore, Plan, Do, Check, Generalize
3. have the ability to apply the concept to new instances
4. think creatively about problems
5. accuracy.
Grading

Assignments (about 5 or 6) 18%
Written midterm 15%
Quest tests 10%
Project 12%
Final exam 45%

- Grading allocation is subject to change
- Course letters will be assigned using standard system
- Two important minimum prerequisites to pass 4M3:
  - 50% or more in the final exam
  - Must submit a course project
Midterms and exam

- Written midterm: Thursday, 16 October, 18:30
  - Optional, no make-up
  - Followed by collaborative midterm
- Quest tests
  - Short duration, computer-based tests
  - Quick answers, to help you stay on top of the material
- Final exam
  - Cumulative of all material

All tests and exams:

- open notes – any form of paper
- any calculator
AIM: a short report on a selected separation process (choice of 3 or 4 units)

- Details to come later on the report's scope
- Only electronic hand-in will be accepted
- Important dates:

  Outline due 14 October
  Project due 07 November
Group-based assignments

- “Appropriate” group work is highly encouraged
  - 30% of course (assignments and project)
- Learn with each other: **groups of 2**, no larger, no exceptions
Group-based assignments

- **Optimal group work**: *an example of one approach*
  - Sarah and Brad work on an assignment
  - Both Sarah and Brad do **all questions** in draft: quick notes at home, on the bus, *etc.*, ±4 days before assignment due
  - Meet in the library next day and go over each other’s notes
  - Explain to the other why you disagree
  - e.g. Sarah sees a mistaken interpretation in Brad’s work
    - She explains why it is a mistake to Brad: Sarah learns
    - Brad also learns: he’s heard this in class, and from Sarah now
    - If neither can resolve it? speak with TA or Kevin
  - Write up a joint solution from both group members’ notes
    - e.g. Sarah does Q1 and 2, Brad does Q3
  - Both review it before submitting

- Other approaches are possible: your group decides
- **What doesn’t work**: Sarah does Q1 and Q2, Brad does Q3; staple and submit
  - Neither learns the other material
Why separate?

  - salt left in water
  - CO$_2$ pumped into the atmosphere
  - pollutants dumped into water
  - your house / condo / apartment

- Things seldom separate out for us in the desired way, unless we put in some **form of work** or **add another material**
- “No free lunch”
Separations in the context of Chemical Engineering

[Turton et al. “Analysis, Synthesis and Design of Chemical Processes”, Appendix B, p 70 (Ethylbenzene process)]
Separations in the context of Chemical Engineering

[Turton et al. “Analysis, Synthesis and Design of Chemical Processes”, Appendix B, p 120 (Acrylic acid process)]
Over to you ...  

Work on the hand-out in groups of 3 or 4  
- Identify separation processes that begin with each letter

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