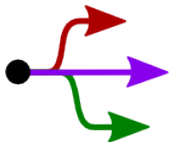


# Separation Processes

ChE 4M3



© Kevin Dunn, 2013

`kevin.dunn@mcmaster.ca`

<http://learnche.mcmaster.ca/4M3>

Overall revision number: 170 (September 2013)

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  - ▶ “This work is the copyright of Kevin Dunn”

(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: 170

# 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.

You are class number 2

# 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](mailto:kevin.dunn@mcmaster.ca)
- ▶ Cell: (905) 921 5803

# Teaching assistant

## Dominik Seepersad

- ▶ [chemac.4m3@gmail.com](mailto:chemac.4m3@gmail.com)
- ▶ JHE, room 370
- ▶ extension 22008
- ▶ Currently doing his M.A.Sc with Tom Adams
- ▶ 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



# Course website

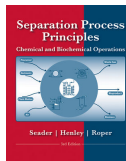
<http://learnche.mcmaster.ca/4M3>

- ▶ Please check several times per 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

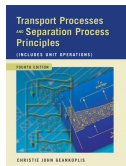
# References and readings

## No required textbook

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



*Recommended:* Geankoplis, “Transport Processes and Separation Process Principles”, (3rd or 4th edition)



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

<http://accessengineeringlibrary.com/browse/perrys-chemical-engineers-handbook-eighth-edition>

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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>

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## LEARNING CHEMICAL ENGINEERING

Courses

Contact info

About Kevin

Teaching

Feedback / questions

### COMMENTS, FEEDBACK, AND QUESTIONS

This form is **completely anonymous**.

I will reply to you if you provide an email address. If not, I will reply publicly on the course website and/or at the next class.

Some examples:

- Where can I find out more about...?
- In the class on Tuesday in reactor design, I didn't understand the concept of calculating....?
- I think that next year you should have the course project due earlier because ...

Please provide any comments and feedback about a course.  
You may also ask any questions about a course here.

Course code: CHE \_ \_ \_

Email address (optional)

Send message to Kevin

## Expectations outside class

- ▶ You can expect TA 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)

# Grading

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)	20%
Written midterm	15%
Quest tests	8%
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: 22 October, 18:30
  - ▶ Optional, no make-up
- ▶ 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

# Project

**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:

Topic selection	04 October, or earlier
Outline due	15 October
Project due	12 November



## Group-based assignments

- ▶ “Appropriate” group work is highly encouraged
  - ▶ 32% of course
- ▶ 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,  $\pm 4$  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

## Group-based assignments

- ▶ **Optimal group work:** *an example of one approach*
  - ▶ Sarah and Brad work on an assignment
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    - ▶ e.g. Sarah does Q1 and 2, Brad does Q3
  - ▶ Both review it before submitting

---

- ▶ Other approaches are possible: your group decides
- ▶ *Work division:* Sarah does Q1 and Q2, Brad does Q3; staple and submit
  - ▶ Neither learns the other material

## 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,  $\pm 4$  days before assignment due
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    - ▶ 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 who does what (e.g. Sarah does Q1 and Q2, Brad does Q3), staple and submit
- ▶ Neither learns the other material

## Group-based assignments

- ▶ **Optimal group work:** *an example of one approach*
    - ▶ Sarah and Brad work on an assignment
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      - ▶ 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

## Over to you ...

Work on the hand-out in groups of 3 or 4

- ▶ Identify separation processes that begin with each letter

<b>A:</b>	<b>I:</b>	<b>R:</b>
<b>B:</b>	<b>J:</b>	<b>S:</b>
<b>C:</b>	<b>K:</b>	<b>T:</b>
<b>C:</b>	<b>L:</b>	<b>U:</b>
<b>D:</b>	<b>M:</b>	<b>V:</b>
<b>E:</b>	<b>N:</b>	<b>W:</b>
<b>F:</b>	<b>O:</b>	<b>X:</b>
<b>G:</b>	<b>P:</b>	<b>Y:</b>
<b>H:</b>	<b>Q:</b>	<b>Z:</b>