Tentative Schedule of Topics

Process Fluid Transport CHE06 309 2 2016

Polymath: Nonlinear Equation Solver (NLE)

Polymath: Differential Equation Solver (DEQ) & COMSOL

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| Date: | Proposed Topics for Section 1: **Wednesday (double period) -** Friday (single period) |
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| **September** 9/2/16 Friday | Course Introduction **Review of Fluid Mechanics**: Statics and Bernoulli Chapter 3.3 Pumps and Gas-Moving Equipment – Geankoplis Chapter 10: Centrifugal Pumps - FMChE |
| 9/7/16 Wednesday | Centrifugal Pumps (continued) |
| 9/9/16 Friday | Centrifugal Pumps (continued) |
| 9/14/16 Wednesday | Centrifugal Pumps: NPSH Complex Flow Networks C&S2nd 8.11 and **FMChE** pages 213-214 |
| 9/16/16 Friday | Complex Flow Networks C&S2nd 8.11 and **FMChE** pages 213-214 (continued) |
| 9/21/16 Wednesday | Single Pump Lab: Standard Pump Curve  POLYMATH – C&S 6.1 & 6.5 (If new to POLYMATH review POLYMATH Introduction) |
| 9/23/16 Friday | Chapter 10: Introduction to Positive Displacement Pumps (Syringe and Squirt Gun) – **FMChE** |
| 9/28/16 Wednesday | Review Chapter 7 The Momentum Balance sections through 7.2 and Geankoplis 2.8Macroscopic Momentum Balance Pipe Flow Laminar Flow Between Parallel Plates Geankoplis 2.9C |
| 9/30/16 Friday | Laminar Flow Between Parallel Plates Geankoplis 2.9C (continued) Momentum Balance Derivation for Laminar flow in a pipe C&S2nd 8.1 Geankoplis 2.9B  Chapter 20 Computational Fluid Dynamics- **FMChE** |
| **October** 10/5/16 Wednesday | Comsol Fluids Computer Lab – Introduction Flow Between Parallel Plates  Exam 1: Pumps and Complex Flow Networks |
| 10/7/16 Friday | Momentum Balance Derivation for Laminar flow in a pipe (continued) |
| 10/12/16 Wednesday | C&S2nd 8.3 Vertical Laminar Flow of a Liquid Film – Newtonian fluidGeankoplis 2.9CComment on Laminar Flow in an Annulus  **Navier Stokes Equations**: Geankoplis 3.6 – 3.7, 3.8B and Chapter 15: Two and Three Dimensional Fluid Mechanics- FMChE Flow Between two coaxial Cylinders, Fluid flow in a rotating cylinder, Geankoplis 3.8C Flow Between two coaxial Cylinders, Fluid flow in a rotating cylinder, Geankoplis 3.8C |
| 10/14/16 Friday | Comsol Fluids Computer Lab– Rotational Flows (Bring your LAPTOP to class) |
| 10/19/16 Wednesday | Geankoplis 3.5 Non-Newtonian Fluids **Non-Newtonian Fluids** – Flow between parallel plates – power law fluid & Bingham Plastics **Non-Newtonian Fluids** – Flow in a horizontal pipe – power law fluid & Bingham Plastics  C&S2nd 8.2 Non-Newtonian laminar flow in a horizontal pipe  Geankoplis 3.5H Non-Newtonian laminar flow in a horizontal pipe |
| 10/21/16 Friday | Non-Newtonian Fluid Flow ContinuedChapter 13 Non-Newtonian Fluid Flow in Circular Pipes – **FMChE**  C&S2nd 8.3 Vertical Laminar Flow of a Liquid Film – Non-Newtonian fluid C&S2nd 8.4 Laminar Flow of Non-Newtonian Fluids in a Horizontal Annulus |
| 10/26/16 Wednesday | Geankoplis 3.5E Laminar Flow of time-Independent Non-Newtonian fluids **Comsol Fluids Computer Lab-Non Newtonian Flows** |
| 10/28/16 Friday | Geankoplis 3.1C Flow in Packed Beds  Chapter 11: Flow Through Porous Media- FMChE |
| **November**  11/2/16 Wednesday | Flow in Packed Beds Continued Experiment: Flow through adsorption column (gravity driven flow) |
| 11/4/16 Friday | Geankoplis 3.1D Flow in Fluidized Beds  Chapter 11: Fluidization – **FMChE** |
| 11/9/16 Wednesday | Exam 2: Momentum Balance: Newtonian and Non-Newtonian Fluids (FMChE Ch 7.2, 13 through 13.3, Geankoplis 2.8-2.9 & 3.5 - 3.8), Navier Stokes Equations (FMChE Ch 15, Geankoplis 3.5-3.8) |
| 11/11/16 Friday | Chapter 12 Gas-Liquid Flow |
| 11/16/16 Wednesday | AIChE Annual Meeting – San Francisco 13-18 November  Assignments – work on optional challenge problems or study for exam 2 and/or Non-Newtonian fluid video |
| 11/18/16 Friday | AIChE Annual Meeting – San Francisco 13-18 November  Assignments – work on optional challenge problems or study for exam 2 and/or Non-Newtonian fluid video |
| 11/23/16 Wednesday | Flow of fluids of Foods: Conduct a fun experiment with a non-newtonian fluid and demonstrate it to other students or family members. See blackboard for more details. Probably the easiest one to conduct is the concentrated corn starch slurry. You must submit either a photo or a video showing yourself doing this demo. |
| 11/30/16 Wednesday | Gas-Liquid Flows Continued **Fluidized Bed Experiment** |
| **December,** 12/2/16 Friday | Gas-Liquid Flows Continued  Compressible Gas Flows Chapter 8 **FMChE** and Geankoplis 2.11 Nozzle Choking, 8.3 **FMChE** |
| 12/7/16 Wednesday | Mixing Geankoplis 3.4 Agitation and Mixing of Fluids and Power Requirements and Chapter 19 Mixing – **FMChE**  **POLYMATH and COMSOL Quizzes** |
| 12/9/16 Friday | Geankoplis 3.4 Agitation and Mixing of Fluids and Power Requirements and Chapter 19 Mixing – **FMChE continued**  Evaluations  Review for final |
| 12/14/16 Wednesday | **Comprehensive Final Exam 8:00 10:00 AM ROWAN 340** |
| Finals Week | 14-20 December |
|  | Go out and make your holiday process fluid transport toys – They make great gifts! |