

Syllabus

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| Course No.: | PPT 211-001 PPT 212-100 PPT 212-101 |
| Course Name: | Advanced Operations Lecture and Lab |
| Semester: | Spring 2021 |
| Credits: | Lecture: 2, Lab: 1 |
| Lecture Meetings: | B036: M, W 8:00-9:00 am |
| Lab Meetings: | A062: M 3:00-5:00 pm (Section 100) A062: T 8:00-10:00 am (Section 101) |
| Instructor: | Andrew D. Sullivan |
| Phone: | 247-3047 |
| Email: | Andrew.Sullivan3@msubillings.edu |
| Faculty Website: | http://www.msubillings.edu/cotfaculty/sullivan/ |
| Office: | A061 – Tech Building |
| Office Hours: | See attached schedule |

Required Texts and Material:

There are no required textbooks to purchase. Required materials will be posted on D2L.

Prerequisites:

PPT 210 - Equipment and Operations Lecture.

Course Description:

Introduces the student to actual refining processes, taking an in-depth look at each process, as well as the unit variables, equipment, critical control areas, product and unit specific safety considerations. Various types of processes are discussed, including Fluid Catalytic Cracking, Alkylation, Catalytic Reforming, Desulfurization, Crude/Vacuum Systems, Amine, Coking, and Hydro treating. The course is also designed to provide classroom time balanced with field review of the various processes.

Course Goals and Objectives:

Upon completing this unit, students will be able to:

1. List and Identify processes important in refining and describe their function.
2. Explain how refinery processes work, how major equipment is utilized in the process, unit feeds and products, how chemical principles apply, how the unit is controlled, how the unit integrates into a refinery, and unit specific safety, operability, and product quality considerations.
3. Apply their knowledge of refining and process operations to construct simplified process flow diagrams for major refinery processes from memory and overall refinery flow plans.

- Analyze how a change in a process operation will impact product qualities at the unit level and at the overall refinery level, evaluate the relative benefits and costs for the change based on their knowledge of refinery economics, and justify if the change is beneficial or not.

Academic Issues and Grading:

- Late work is not accepted.
- Final lecture grades will be calculated per the following scoring criteria:

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| Tests (average of 3 evenly split) | 80% |
| Assignments | 20% |

- Final lab grades will be calculated according to the following scoring criteria:

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| Lab Assignments | 100% |
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Being on time, acting in a safe way, and participating in lab are required for full credit.

- Grade Scale:

| Grade | Percentage | GPA | | Grade | Percentage | GPA |
|-------|------------|-----|--|-------|------------|-----|
| A | 93 - 100 | 4.0 | | C | 73 - 77 | 2.0 |
| A- | 90 - 93 | 3.7 | | C- | 70 - 73 | 1.7 |
| B+ | 87 - 90 | 3.3 | | D+ | 67 - 70 | 1.3 |
| B | 83 - 87 | 3.0 | | D | 63 - 67 | 1.0 |
| B- | 80 - 83 | 2.7 | | D- | 60 - 63 | 0.7 |
| C+ | 77 - 80 | 2.3 | | F | 0 - 60 | 0.0 |

Course Outline:

The following plan is a guideline that will be adjusted to meet the needs of the class.

| Week | Day | Class | Lab | Class | Lab |
|------|-----------|-------|-----|--|---|
| 1 | Wed 01/13 | 1 | | Refinery Configuration | |
| 2 | Mon 01/18 | | | Martin Luther King Day NO CLASSES OFFICES CLOSED | |
| | Tue 01/19 | | 1 | | SPM-600 Unit Operations (cause & effect) |
| | Wed 01/20 | 2 | | Refinery Configuration | |
| 3 | Mon 01/25 | 3 | 1 | Refinery Configuration | SPM-600 Unit Operations (cause & effect) |
| | Tue 01/26 | | 2 | | SPM-600 Unit Operations (troubleshooting) |
| | Wed 01/27 | 4 | | Petroleum Characteristics | |
| 4 | Mon 02/01 | 5 | 2 | Petroleum Characteristics | SPM-600 Unit Operations (troubleshooting) |
| | Tue 02/02 | | 3 | | SPM-700 Distillation (troubleshooting) |
| | Wed 02/03 | 6 | | Product Blending | |
| 5 | Mon 02/08 | 7 | 3 | FCC units | SPM-700 Distillation (troubleshooting) |
| | Tue 02/09 | | 4 | | SPM-1200 Fired Heater (troubleshooting) |
| | Wed 02/10 | 8 | | FCC units | |
| 6 | Mon 02/15 | | | Presidents' Day NO CLASSES OFFICES CLOSED | |
| | Tue 02/16 | | 5 | | SS - ADU (What-If) |
| | Wed 02/17 | 9 | | Test #1 | |
| 7 | Mon 02/22 | 10 | 4 | FCC units | SPM-1200 Fired Heater (troubleshooting) |
| | Tue 02/23 | | 6 | | SS - ADU (Optimization) |
| | Wed 02/24 | 11 | | Gas Processing - Feed Receiving | |
| 8 | Mon 03/01 | 12 | 5 | Gas Processing - Amine Systems | SS - ADU (What-If) |
| | Tue 03/02 | | 7 | | SPM-2400 FCCU (What-If) |
| | Wed 03/03 | 13 | | Gas Processing - Amine Systems | |
| 9 | Mon 03/08 | 14 | 6 | Gas Processing - Lean Oil Absorption | SS - ADU (Optimization) |

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| | Tue 03/09 | | 8 | | SPM-2400 FCCU (Max Naphtha) |
| | Wed 03/10 | 15 | | Gas Processing - Cryogenic Recovery | |
| 10 | Mon 03/15 | 16 | 7 | Gas Processing - Fractionation | SPM-2400 FCCU (What-If) |
| | Tue 03/16 | | 9 | | SPM-3100 Amine Treating (skim drum) |
| | Wed 03/17 | 17 | | Test #2 | |
| 11 | Mon 03/22 | 18 | 8 | Distillation Startup | SPM-2400 FCCU (Max Naphtha) |
| | Tue 03/23 | | 10 | | SPM-3700 NGL Plant (Unit flow plan) |
| | Wed 03/24 | 19 | | Distillation Startup | |
| 12 | Mon 03/29 | 20 | 9 | Merox | SPM-3100 Amine Treating (skim drum) |
| | Tue 03/30 | | 11 | | SPM-3700 NGL Plant (What-If) |
| | Wed 03/31 | 21 | | Merox | |
| 13 | Mon 04/05 | 22 | 10 | Hydrotreating | SPM-3700 NGL Plant (Unit flow plan) |
| | Tue 04/06 | | 12 | | PHP Distillation Optimization |
| | Wed 04/07 | 23 | | Hydrotreating | |
| 14 | Mon 04/12 | 24 | 11 | Coking | SPM-3700 NGL Plant (What-If) |
| | Tue 04/13 | | 13 | | PHP Distillation Tuning |
| | Wed 04/14 | 25 | | Coking | |
| 15 | Mon 04/19 | | | Final Exam 8:00-10:00 am | |

Safety:

Some hazards can't be eliminated in a process plant or academic setting and must be managed to prevent serious injury. A discussion of hazards and how to mitigate them will be part of lectures, labs, and other activities and will include safety equipment checks, personal protective equipment requirements, and training. Student responsibilities include:

- Be fully engaged so you understand the hazards and are prepared to manage them.
- Be in a suitable physical and mental state to perform safely and determine if you are prepared to engage in an activity.
- Wear all required PPE. Safety glasses are always required in the lab. No open-toe shoes are allowed in the lab.
- Perform safely and professionally. Horseplay gets people hurt.
- Follow all rules and procedures.

Failure to follow safety rules may result in a written warning, a failing grade for the assignment or course, or loss of laboratory / activity privileges to protect other students. MSUB is not responsible for injury resulting from failure to follow rules or procedures.

Access, Assistance, and Advocacy:

A summary of services to help you succeed in a positive, supportive, and enjoyable learning environment is listed below.

- [Academic Support Center](#). The City College branch is open M-F 9-5. Resources include tutoring and a writing center. Drop-in and by appointment. 247-3022.
- [Disability Support Services \(DSS\)](#). MSU Billings is committed to providing equal access. Please meet with me to discuss ways to ensure your full participation if you anticipate barriers. DSS will help us (247-3029, Tech Building A011).
- [TRIO/Student Support Services](#). Support for low income, first generation, and disabled students enrolled in a 4-year program (or 2+2 at City College). 657-2162

- [Native American Achievement Center](#). Advocacy and assistance for American Indian students. 657-2144
- [Student Health Services](#). Student Health Services provides medical care, mental health counseling, wellness services and education, and violence advocacy and prevention services. Located above the Academic Support Center at City College. Students can use Health Services even if they waive the student health insurance plan. 657-2153
- [Veterans Services](#). For assistance activating your VA Educational Benefits, getting access to VA assistance for tutors, or even joining the veteran student organization, contact the VA Representative in the Military and Veterans Success Center at 657-2982. For assistance on the posting of your VA Educational benefits please contact the Business Services office at 657-1707.
- [Veterans Upward Bound](#). Assistance for veterans from admission to graduation. 657-2075

Class and Lab Policies:

- We will follow all rules and guidance set by the University.
- Academic or personal misconduct will be managed per the procedures outlined in the [MSU Billings Student Policies & Procedures Handbook](#).
- Phones, computers, and tablets are not allowed in class.
- Food and drinks are not allowed in classrooms or labs.
- Disruptive behaviors will result in final grade reductions up to 10% per occurrence.

Andy Sullivan's Spring 2021 Calendar

| | Monday | Tuesday | Wednesday | Thursday | Friday |
|-------------|--------------|--------------|--------------|--------------|---------|
| 8:00-9:00 | PPT 211 | PPT 212 | PPT 211 | | |
| 9:10-10:10 | Office Hours | | Office Hours | | PPT 176 |
| 10:20-11:20 | PPT 225 | Office Hours | PPT 225 | | |
| 11:30-12:30 | Lunch | Lunch | Lunch | Lunch | Lunch |
| 12:40-1:40 | PPT 120 | PPT 161 | PPT 120 | PPT 161 | PPT 176 |
| 1:50-2:50 | PPT 175 | PPT 175 | PPT 175 | PPT 175 | |
| 3:00-4:00 | PPT 212 | | | Office Hours | |
| 4:10-5:10 | | | | | |