



## Syllabus

Course Number:	PPT 210-001 (Lecture) PPT 208-100 (Lab) PPT 208-101 (Lab)
Course Name:	Equipment and Operations Lecture and Lab
Semester:	Fall 2020
Credits:	Lecture: 4, Lab: 2
Class Meetings:	B036: MTWR 10:20-11:20 am
Lab Meetings:	Section 100: A062: TR 1:50-3:50 pm Section 101: A062: F 9:10-11:10 & F 12:40-2:40
Instructor:	Andrew D. Sullivan
Phone:	247-3047
Email:	<a href="mailto:Andrew.Sullivan3@msubillings.edu">Andrew.Sullivan3@msubillings.edu</a>
Faculty Website:	<a href="http://www.msubillings.edu/cotfaculty/sullivan/">http://www.msubillings.edu/cotfaculty/sullivan/</a>
Office:	A061 – Tech Building
Office Hours:	See faculty website link above

### Required Texts and Material:

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

### Course Description:

Covers the equipment necessary for the operation of a process/refining plant. A few topics of discussion include pumps, compressors, valves, heat exchangers, distillation towers, cooling towers, as well as auxiliary systems. Some of the operation principles reviewed are pneumatics, boilers, hydraulic functions, furnace processes, reactor systems, and distillation. Reading process flows and instrument diagrams is also included.

### Course Goals and Objectives:

Upon completion of this course, students will be able to:

1. Describe the purpose and function of major process equipment and systems including related instrumentation and control systems.
2. Operate this equipment including startup, shutdown, and malfunction scenarios.
3. Recognize and analyze abnormal operations and apply troubleshooting skills to resolve.

### Access, Assistance, and Advocacy:

Your success in a positive, supportive, and enjoyable learning environment is my primary objective and the University's. Please let me know if there are barriers that I can help to address. We have a great support network to help. A summary of services is listed below. You can work with them directly or involve me as you prefer.

- [Academic Support Center](#). Resources include tutoring and a writing center. Drop-in and by appointment.



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- [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. 657-3027.
- [Veterans Services](#). For assistance activating your VA Educational Benefits, getting access to VA assistance for tutors, or joining the veteran student organization, contact the VA Representative in the Military and Veterans Success Center, Dawn Githens, at 657-2968. For assistance on the posting of your VA Educational benefits please contact Renee Haefer in the Business Services office at 657-1707.
- [Veterans Upward Bound](#). Assistance for veterans from admission to graduation. 657-2075

### Academic Issues and Grading:

1. Late work is not accepted. It is not fair to the rest of the class to make exceptions. It is possible that a due date might be extended for the whole class beforehand with appropriate class discussion.
2. Final lecture grades will be calculated per the following scoring criteria:

Tests (average of 3 evenly split)	60%
Assignments	40%

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

Average of individual lab grades	100%
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4. 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



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### Course Outline:

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

Week	Day	Class	Lab	Lab	Class Plan	Lab Plan
1	Wed 08/19	1			Syllabus Review / Course Introduction	
	Thu 08/20	2	1		Pump review	Mount motor and pump
	Fri 08/21			1&2		
2	Mon 08/24	3			Pump review	
	Tue 08/25	4	2		Pump review	Align motor and pump
	Wed 08/26	5			Pump review	
	Thu 08/27	6	3		Motors and Turbines	Wire motor and pump
	Fri 08/28			3&4		
3	Mon 08/31	7			Motors and Turbines	
	Tue 09/01	8	4		Motors and Turbines	Prepare pump performance curve
	Wed 09/02	9			Motors and Turbines	
	Thu 09/03	10	5		Tanks	Boiler Hydro Test
	Fri 09/04			5&6		
4	Mon 09/07				Labor Day NO CLASSES OFFICES CLOSED	
	Tue 09/08	11	6		Tanks	Boiler SU
	Wed 09/09	12			Tanks	
	Thu 09/10	13	7		Tanks	Boiler Water Chemistry
	Fri 09/11			7&8		
5	Mon 09/14	14			Heat Exchangers	
	Tue 09/15	15	8		Heat Exchangers	Steam Trap Operation / Boiler Layout
	Wed 09/16	16			Heat Exchangers	
	Thu 09/17	17	9		Heat Exchangers	Rankine Cyclor
	Fri 09/18			9&10		
6	Mon 09/21	18			Centrifugal Compressors	
	Tue 09/22	19	10		Centrifugal Compressors	Combustion Efficiency
	Wed 09/23	20			Test #1	
	Thu 09/24	21	11		Centrifugal Compressors	Centrifugal compressor operation
	Fri 09/25			11&12		
7	Mon 09/28	22			Centrifugal Compressors	
	Tue 09/29	23	12		Centrifugal Compressors	Build a recip compressor system
	Wed 09/30	24			Centrifugal Compressors	
	Thu 10/01	25	13		Centrifugal Compressors	Build a recip compressor system
	Fri 10/02			13&14		
8	Mon 10/05	26			Centrifugal Compressors	
	Tue 10/06	27	14		Reciprocating Compressors	Recip compressor operation
	Wed 10/07	28			Reciprocating Compressors	
	Thu 10/08	29	15		Reciprocating Compressors	Graduation Application
	Fri 10/09			15&16		
9	Mon 10/12	30			Reciprocating Compressors	
	Tue 10/13	31	16		Distillation	Multi-component flash
	Wed 10/14	32			Distillation	
	Thu 10/15	33	17		Distillation	D-86 Distillation
	Fri 10/16			17&18		
10	Mon 10/19	34			Distillation (Registration for spring starts)	
	Tue 10/20	35	18		Distillation	D-86 Simulation - Pure vs mix
	Wed 10/21	36			Distillation	
	Thu 10/22	37	19		Distillation	D-86 Simulation - Match the Distillation Curve
	Fri 10/23			19&20		
11	Mon 10/26	38			Distillation	
	Tue 10/27	39	20		Distillation	D-86 Simulation - Compare with 15/5
	Wed 10/28	40			Distillation	
	Thu 10/29	41	21		Test #2	Binary Distillation Introduction
	Fri 10/30			21*22	Last Day to Apply to Graduate Spring Semester 2021	
12	Mon 11/02	42			Reactor Systems / HDS	
	Tue 11/03				Election Day NO CLASSES OFFICES CLOSED	
	Wed 11/04	43			Reactor Systems / HDS	
	Thu 11/05	44	22		Reactor Systems / HDS	Binary Distillation What-If



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	Fri 11/06			23*24		
13	Mon 11/09	45			Reactor Systems / HDS	
	Tue 11/10	46	23		Reactor Systems / HDS	Binary Distillation Tuning
	Wed 11/11				Veterans Day NO CLASSES OFFICES CLOSED	
	Thu 11/12	47	24		Reactor Systems / HDS	Binary Distillation Optimize
	Fri 11/13			25&26		
14	Mon 11/16	48			Furnaces	
	Tue 11/17	49	25		Furnaces	Binary Distillation Cold Start
	Wed 11/18	50			Furnaces	
	Thu 11/19	51	26		Furnaces	Furnace Flooding Response
15	Mon 11/23				Final Exam 10-12 noon in B036	

### Maintaining an educative and safe learning environment

It is important that we work together to maintain classroom and lab environments where all students can safely and effectively learn. The following are some base expectations.

#### Misconduct:

Academic or personal misconduct will be managed per the procedures outlined in the [MSU Billings Student Policies & Procedures Handbook](#).

Instances of academic dishonesty or cheating on homework, exams, or assignments may result in written reprimand, a grade of "F" for the assignment or test involved, or a grade of "F" for the course. Examples of cheating include:

- Sending someone the spreadsheet or Visio drawing you prepared for homework. Taking someone else's file and handing it in if it has been modified or not.
- Informing someone of your homework answers or submitting answers you received. Homework done in groups where one or more individuals are receiving answers without doing the work is cheating for all involved.

#### Cell Phones and Electronic Devices:

Electronic devices including phones, computers, and tablets are distracting and not allowed in class or lab except where properly authorized.

#### Food and Drinks:

Food and drinks are not allowed in classrooms or labs. They are dangerous in a lab environment, create messes in classrooms, and they interfere with the intent of COVID-19 face covering requirements.

#### COVID-19:

We need to work together on this to protect the members of our community. We will follow guidance in the [Montana State University Billings Back to Business Fall 2020 Action Plan](#) which may be updated throughout the semester.

We are required to wear face coverings properly in classrooms, labs, and other inside areas. We view this as good citizenship and protecting our fellow community members. Failure to wear face coverings when required creates an unsafe environment. The face



coverings we are required to wear are simple and comfortable compared to the Personal Protective Equipment (PPE) you will be required to wear in industry.

### **Safety:**

Some hazards cannot 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 will negatively impact grades and could result in losing laboratory privileges to maintain a safe environment. MSUB is not responsible for injury resulting from failure to follow rules or procedures.

### **Coaching, Mentoring, and When They Don't Work:**

Lapses in conduct will be addressed with mentoring and coaching to prepare individuals for success in the workplace if the lapses are infrequent, accidental, and are minor in potential consequence.

Repeated or intentional disruptive or unsafe behaviors will be reported to the Dean of Student Engagement and result in final grade reductions up to 10% per occurrence depending on severity.