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**SECOND SEMESTER 2020-21**  
**COURSE HANDOUT**

**Date: 18-Jan-21**

In addition to part I (General Handout for all courses appended to the Time table) this portion gives further specific details regarding the course.

<b>Course No</b>	<b>: CHE F341</b>
<b>Course Title</b>	<b>: Chemical Engineering Laboratory - II</b>
<b>Instructor-in-Charge</b>	<b>: BHANU VARDHAN REDDY KUNCHARAM</b>
<b>Practical Instructor(s)</b>	<b>: Hare Krishna Mohanta, Arkaprovo Ghosal</b>

### **1. Course Description:**

This course aims to help students gain practical experience using laboratory-scale experiments to supplement theory courses taught in classroom with major focus on chosen experiments from *Kinetics and Reactor Design, Process Dynamics and Control* and *Separation Processes* – 2. Students will collect and analyze experimental data using theoretical principles related to relevant courses already covered in previous Semesters.

### **2. Scope and Objective of the Course:**

The main objective of this course is to educate students with different aspects of chemical engineering experiments. The students will carry out experiments that will expose them to experimental methods and integrate theoretical knowledge and concept to practical experience. Students will also learn the operation of some scientific equipment for performing experiments.

### **3. Text Books:**

Laboratory Manual for Chemical Engineering Laboratory - II.

### **4. Reference Books:**

1. Seborg, D. E., Edgar, T. F. and Mellichamp, D.A., Doyle, F.J., "Process Dynamics and Control", 3<sup>rd</sup> Ed., John Wiley and Sons, 2011.
2. Fogler, H. Scott "Elements of Chemical Reaction Engineering", Pearson Education, Inc., 4<sup>th</sup> Ed, 2006
3. McCabe W. L., and Smith J. M., & Harriott P., Unit Operations of Chemical Engineering, 7th Ed., McGraw-Hill International Edition, 2006.



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## 5. Course Plan:

S. No.	Experiment	Lab Manual Ref	Date of the Experiment	Lab Records Due Date	Date of Quiz (during regular lab)
0.	Orientation & Introduction		19/01/2021, 21/01/2021	-	-
1.	a. Cone Classifier and b. Thickener	9	28/01/2021	04/02/2021	04/02/2021
2.	Plate and Frame Filter Press	10	02/02/2021	09/02/2021	09/02/2021
3.	Rotary Vacuum Filter	11	04/02/2021	11/02/2021	11/02/2021
4.	a. Basket Centrifuge, b. Froth Floatation Cell	12	09/02/2021	16/02/2021	18/02/2021
5.	a. Jaw Crusher, Roll Crusher, c. Ball mill	13	11/02/2021	18/02/2021	23/02/2021
6.	Isothermal Batch Reactor	1	18/02/2021	25/02/2021	25/02/2021
7.	Isothermal Semi batch reactor	2	23/02/2021	09/03/2021	09/03/2021
8.	a. Isothermal CSTR (Jacket heating) b. Isothermal CSTR (coil heating)	3	25/02/2021	11/03/2021	11/03/2021
9.	a. Isothermal PFR (Straight tube type) b. Isothermal PFR (Coiled tube type)	4	09/03/2021	16/03/2021	18/03/2021
10.	Packed Bed Reactor	5	16/03/2021	23/03/2021	23/03/2021
11.	Cascade CSTR	6	18/03/2021	25/03/2021	25/03/2021
12.	Combined flow Reactor	7	23/03/2021	30/03/2021	30/03/2021
13.	a. RTD studies CSTR, b. RTD studies PFR, c. RTD studies Packed Bed Reactor	8	25/03/2021	01/04/2021	01/04/2021
14.	First Order and second Order System	14	30/03/2021	06/04/2021	06/04/2021
15.	Multi Process Trainer (FBC, FFC, and Ratio control)	15	01/04/2021	08/04/2021	08/04/2021
16.	Pressure Control Trainer	16	06/04/2021	13/04/2021	13/04/2021
17.	Flow Control Trainer	17	08/04/2021	15/04/2021	15/04/2021
18.	Control Valve Characteristics	18	13/04/2021	20/04/2021	20/04/2021



## 6. Evaluation Scheme:

EC No.	Evaluation Component	Duration	Marks	Weightage	Date & Time	Nature of Component
Continuous Evaluation						
1.	Exp. Report (Data Analysis & Visualization, Critical Thinking, Discussion)	-	$18 \times 5 = 90$	30%	Regular Lab hours	Open Book
2.	Quiz (Best 15 out of 18)	10 min	$15 \times 6 = 90$	30%	Regular Lab hours	Closed Book
Subtotal of continuous evaluation			180	60%		
Mid-Sem and End-Sem Examinations/Viva						
3.	Mid-Sem Viva	To be announced	30	10%	During pre-announced dates/slots & during regular online lab hours	Closed Book
4.	End Semester Examination	To be announced	90 (Viva: 45, Lab exam: 45)	30%	Viva would be conducted during pre-announced dates/lots & during regular online lab hours	Closed Book & Open Book
Subtotal of mid & end-sem evaluation			120	40%		
Grand Total			300	100%		

## 7. Software & Technology:

- Students are expected to acquire a computer with desired hardware, software capable of handling online classes. High-speed internet may be required for streaming the lab sessions.
- Online lab sessions will be conducted via **Google Meet**, and all relevant material will be posted on **Google Classroom**.

## 9. Evaluative Components and Associated Policies:

### 9.1. Lab Report Submission:

- A group of 5-6 students are formed at the beginning of the semester.
- All members of each group will unanimously identify a group leader who would be responsible for communication. Please note that the group leader is just for facilitation purpose and by no means should be considered authoritative. All group members shall be deemed equal.
- On the day of conduction of the online lab experiment, a datasheet with experimental results will be sent to the identified group leader. The identified group leader will be responsible for coordinating among group members for completion of lab records.



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- *Lab record includes sample calculation and calculation table (1 mark), graph(s) and data visualization (1 mark), discussion and critical data analysis (2 marks), final conclusion (1 mark). All group members will participate in this activity and contribute in the lab record writing.*
- It is expected that you will submit your lab report as a single pdf file. Please make sure you write names and IDs of all group members on top of each page with the group leader's name highlighted. You are free to use any platforms/software for report generation, data analysis and visualization. Use of technology is encouraged. **Handwritten and scanned reports will not be accepted.**
- The lab report will be due one week after completing the experiment (all dates are marked out in the schedule). The designated group leader will submit the report online in the google classroom. It is the responsibility of all group members to ensure the report is completed and submitted within the deadline.
- **Late Submission Policy:** As highlighted in the schedule, the lab records will be due at 1:59 pm a week after the experiment's conduction. If you miss this deadline, you can still submit your lab record with the procedure described above; however, in this case, there will be a 50% penalty. This late submission policy is applicable for only *one more week* following the original deadline. However, if your group failed to submit a lab report even after two weeks of original conduction of the experiment, your group will be awarded zero points for that experiment. Each group member's collective responsibility is to make sure their group leader submits the lab report on time. No exceptions will be entertained in this regard. The decision of the I/C will be final in all such cases.
- **Plagiarism:** As highlighted, you are requested to submit a professional quality digital lab report in a single pdf file. It is expected that each group will submit their original lab report. Plagiarism might be construed as academic dishonesty, and your submitted lab reports might be subjected through plagiarism detection software(s). While we understand there might be a few technical phrases common in all the lab reports, there will not be any penalty for similarity up to 20%. However, 50% marks deduction for both the groups whose reports are 20%-40% similar. If found more than 40% similarity, zero marks will be awarded for both the groups. The decision of the I/C will be final in all such cases.
- Since it is a kind of pseudo-flipped mode of teaching/learning, and mainly since all the lab procedures will be made available, there will not be any lab makeup. If students miss a particular lab-session, they are encouraged to go through the recorded lab video in their own time and catch-up with their group members to complete lab reports. They may also consult instructor(s) in the online consultation hours announced or during the next regular lab session.

#### 9.2. Quizzes:

- Quizzes are part of the continuous evaluation process and designed as per the latest guidelines from AUGSD.
- Total 18 quizzes of 6 marks each will be conducted during the regular lab hours as per dates announced in the schedule. These quizzes will be conducted online.
- Out of 18, the best 15 will be taken for final evaluation.
- Quizzes are timed and closed book. Each student will attempt the quiz individually without consulting his/her group or classmates. Any cheating/coordination/unfair means will be reported to AUGSD.
- Makeup is only provided for genuine cases. Prior permission has to be taken from the I/C. The decision of the I/C will be final in all such cases.

#### 9.3. Viva-voce:

- Viva is an integral part of this course and will be conducted during the mid-semester (30 marks) and end-semester (45 marks).
- Mid-semester viva will be based on experiments 1 to 8 while end-semester viva will be based on experiments 9 to 18.



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- Viva will be conducted online via Google Meet with your group members which you will have selected as described in 9.1.
- Viva is a closed book, and you will be tested on the clarity of concepts related to the experiments conducted, background theory, experimental procedure, calculations, data analysis and applications.
- A panel of all instructors will take the viva and give individual marks. Average of those marks would then be taken and communicated to you. We will not be able to give you individual break-down marks.
- Only genuine requests for viva makeup backed by paperwork/evidence will be entertained. Prior email permission would be necessary. The decision of the I/C will be final in all such cases.

#### **9.4. Comprehensive Examination:**

- There would be a written comprehensive examination for 45 marks.
- The syllabus for comprehensive examination will be all experiments.

#### **7. Chamber Consultation Hour:**

To be announced

#### **8. Notices:**

All notices will be posted in **Google Classroom**. Google Class room is available for BITS email address only, no access is provided for other emails.

#### **9. Makeup Policy:**

Makeup for selected evaluation components will be granted for genuine cases only. Except for an emergency, for all other cases, prior permission of the I/C is mandatory. The decision of the I/C will be final in all the cases.

#### **10. Note (if any):**

Any change(s) in the course handout will be communicated in the regular class or through email.

**BHANU VARDHAN REDDY KUNCHARAM**

**Instructor-in-charge**  
**Course No. CHE 341**