

Date- 25/06/2018

# Hindustan College of Science & Technology

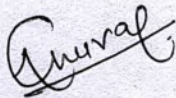
(Farah, Mathura)

## Chemical Engineering Department

### Notice

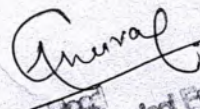
This is for information to all the students of 2<sup>nd</sup>, 3<sup>rd</sup> year that the Value Added Course **(Process Equipment Design & Solid Waste Management)** shall begin from 14<sup>th</sup> of July 2018. All the students of 2<sup>nd</sup>, 3<sup>rd</sup> year are directed to register themselves and fill up the registration form in the departments before start of the regular classes for the above courses.

The registration can be done from 2<sup>nd</sup> July 2018 up to 07<sup>th</sup> July 2018.



Mr. Anurag Bajpai

Head, Department of Chemical Engineering



Department of Chemical Engg.  
Hindustan College of Science & Technology  
Farah, Mathura.



Director  
Hindustan College of  
Science & Technology  
FARAH (MATHURA)



**HINDUSTAN COLLEGE OF SCIENCE & TECHNOLOGY,  
FARAH -MATHURA**  
**DEPARTMENT OF CHEMICAL ENGINEERING**



*Value Added Course*  
**VAC-1701-Process Equipment Design**

*14<sup>th</sup> July 2018 – 17<sup>th</sup> Nov 2018 - Every Saturday: 3:10 PM – 4:50 PM*



By

*Mr. Anurag Bajpai*  
*HOD -Chemical Engineering*

**Registration Dates**  
2<sup>nd</sup> July 2018 – 07<sup>th</sup> July 2018

For Registration: Please contact  
Mr. Raj Kumar, Office Staff, Department of Chemical Engineering

*Anurag Bajpai*  
Head  
Department of Chemical Engng.  
Hindustan College of Science & Technology  
Farah, Mathura

*Raj Kumar*  
Director  
Hindustan College of  
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# HINDUSTAN COLLEGE OF SCIENCE & TECHNOLOGY, FARAH -MATHURA



## DEPARTMENT OF CHEMICAL ENGINEERING

### *Value Added Course*

### **VAC -1701 - Process Equipment Design**

**14<sup>th</sup> July 2018 – 17<sup>th</sup> Nov 2018 - Every Saturday: 3:10 PM – 4:50 PM**

### Course Objectives

The main objective of this value added course are as follows:

1. Plan logistics for waste collection and disposal .
2. Formulate strategies for segregation of waste and waste reduction.
3. Plan appropriate recycles facility for heterogeneous wastes.
- 4 Plan and design waste collection systems.

### Course Syllabus

Units	Details	Course- Out comes
1	Introduction to waste management Logistics, importance, methods of logistics, human components, technological components- waste handling equipment and technology, and managerial goals, steps in waste management logistics	CO1
2	Waste collection system and organization Environmental aspects of waste collection, role of public authority and private sector in waste collection, organizing collection of residential waste, fee schemes, public awareness programs	CO2
3	Source segregation and collection source-segregated waste, Purpose of source segregation, segregation criteria and guidance, segregation potential and efficiencies, systems for collecting segregated fraction	CO3
4	Waste transfer stations Waste delivery, waste transfer, transportation of the reloaded waste, siting and Design of waste transfer station, economical considerations, recycling solid wastes, materials recovery facilities	CO4

*Guver*  
Head  
Department of Chemical Engg.  
Hindustan College of Science & Technology  
Farah, Mathura

*Director*  
Director  
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# HINDUSTAN COLLEGE OF SCIENCE & TECHNOLOGY, FARAH -MATHURA



## DEPARTMENT OF CHEMICAL ENGINEERING

*Value Added Course*

**VAC-1701 - Process Equipment Design**

**14<sup>th</sup> July 2018 – 17<sup>th</sup> Nov 2018 - Every Saturday: 3:10 PM – 4:50 PM**

### Course Outcomes

- CO1 Plan logistics for waste collection and disposal  
Formulate strategies for segregation of waste and waste reduction.
- CO2
- CO3 Plan appropriate recycles facility for heterogeneous wastes.
- CO4 Plan and design waste collection systems.

### CO-PO Mappings

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3											2		
CO2	2	3											2		
CO3	2			3						2	2	2	2		
CO4			2	3						2	2	2		3	
Average	2	3	2	3						2	2	2	2	3	

**Evaluation Criteria: 1. Evaluation of Practical assignments, Group project, Viva/Quiz**

*Shivraj*  
Head  
Department of Chemical Engg  
Hindustan College of Science & Technology  
Farah, Mathura

*[Signature]*  
Director  
Hindustan College of  
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**HINDUSTAN COLLEGE OF SCIENCE & TECHNOLOGY, FARAH -MATHURA**  
**DEPARTMENT OF CHEMICAL ENGINEERING**

*Value Added Course*  
**VAC-1701 - Process Equipment Design**



**Program Schedule**

*14<sup>th</sup> July 2018 – 17<sup>th</sup> Nov 2018 - Every Saturday: 3:10 PM – 4:50 PM*

Session	Date	Time	No of Lectures	Session Topic	Resource Person
1	21-07-2018	3:10 PM – 4:50 PM	2	Topic 1: Design project procedure, design information from the literature	Mr. Anurag Bajpai
2	28-07-2018	3:10 PM – 4:50 PM	2	Topic 2: Flow diagrams, preliminary design	Mr. Anurag Bajpai
3	04-08-2018	3:10 PM – 4:50 PM	2	Topic 3: Comparison of different processes, equipment design	Mr. Anurag Bajpai
4	11-08-2018	3:10 PM – 4:50 PM	2	Topic 4: Scale-up in design, Materials of construction	Mr. Anurag Bajpai
5	18-08-2018	3:10 PM – 4:50 PM	2	Topic 5: Selection of materials, fabrication of equipment	Mr. Anurag Bajpai
6	25-08-2018	3:10 PM – 4:50 PM	2	Topic 6: Pressure vessels – calculation of thickness of cylindrical and spherical shells	Mr. Anurag Bajpai
7	01-09-2018	3:10 PM – 4:50 PM	2	Topic 7: Subjected to internal pressure, heads or covers	Mr. Anurag Bajpai
8	08-09-2018	3:10 PM – 4:50 PM	2	Topic 8: Storage vessels – storage of nonvolatile liquids, storage of volatile liquids	Mr. Anurag Bajpai
9	15-09-2018	3:10 PM – 4:50 PM	2	Topic 9: Storage of gases. Supports for vessels – bracket or lug supports	Mr. Anurag Bajpai
10	22-09-2018	3:10 PM – 4:50 PM	2	Topic 10: Leg supports, skirt supports, saddle supports	Mr. Anurag Bajpai
11	29-09-2018	3:10 PM – 4:50 PM	2	Topic 11: Design of double pipe heat exchangers	Mr. Anurag Bajpai
12	06-10-2018	3:10 PM – 4:50 PM	2	Topic 12: Shell and tube heat exchangers (1-2,2-4), optimum design and heat recovery	Mr. Anurag Bajpai
13	13-10-2018	3:10 PM – 4:50 PM	2	Topic 13: Selection of suitable heat exchanger	Mr. Anurag Bajpai
14	20-10-2018	3:10 PM – 4:50 PM	2	Topic 14: Design of single and multiple effect evaporators without boiling point elevation	Mr. Anurag Bajpai
15	27-10-2018	3:10 PM – 4:50 PM	2	Topic 15: Finite-stage contactors- bubble cap tray, sieve tray and valve tray units	Mr. Anurag Bajpai
16	03-11-2018	3:10 PM – 4:50 PM	2	Topic 16: Maximum allowable vapor velocities, plate and column efficiency, other design factors	Mr. Anurag Bajpai
17	10-11-2018	3:10 PM – 4:50 PM	2	Topic 17: Continuous contactors – types of packing, liquid distribution, pressure drop	Mr. Anurag Bajpai
18	17-11-2018	3:10 PM – 4:50 PM	2	Topic 18: Packing efficiencies. Relative merits of plate and packed towers, selection of contacting equipment	Mr. Anurag Bajpai
<b>Total Number of Hours covered</b>			<b>36 (30 Hours)</b>		

*Anurag*  
 Head  
 Department of Chemical Engng  
 Hindustan College of Science & Technology  
 Farah, Mathura

*Anurag*  
 Director  
 Hindustan College of  
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 FARAH (MATHURA)

# Hindustan College of Science and Technology - Mathura

Department Name: **CHEMICAL ENGINEERING**

## CLASS TIME TABLE FOR ODD SEMESTER 2018-19

<b>SESSION:</b>	2018-19		<b>W.E.F :</b>	7/26/2018	<b>CLASS TEACHER:</b>	Mr. Anoop Kumar Sengar			
<b>YEAR/SEM-SEC:</b>	III Year/ (V Sem)		<b>ROOM.NO :</b>	504-B	<b>COUNSELLORS :</b>	Mr. Anoop Kumar Sengar			
<b>Time / Day</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>	<b>VI</b>	<b>VII</b>	<b>VIII</b>	
	10:10 TO 11:00	11:00 TO 11:50	11:50 TO 12:40	12:40 TO 01:30	01:30 TO 02:20	02:20 TO 03:10	03:10 TO 04:00	04:00 TO 04:50	
<b>MONDAY</b>	OT	CRE-I	MT-II	Mana.Econ.	LUNCH	CRE LAB			
	AKS	AB	SKV	SS		AB			
	504-B	504-B	504-B	504-B		502			
<b>TUESDAY</b>	MT-II	CRE-I	Sociology	OT		MTO-II LAB			
	SKV	AB	AG	AKS		SKV			
	504-B	504-B	504-B	504-B		502-A			
<b>WEDNESDAY</b>	OT	MT-II	Soft Computing Lab			Mana.Econ.	MT-II		
	AKS	SKV	AKS			SS	SKV		
	504-B	504-B	404			504-B	504-B		
<b>THURSDAY</b>	CRE-I	CT	Chemical Technology Lab			Sociology	CT		
	AB	LSB	AB			AG	AB		
	504-B	504-B	501			504-B	504-B		
<b>FRIDAY</b>	OT	Mana.Econ.	Sociology	MT-II		CT	CT		
	AKS	SS	AG	SKV		AB	LSB		
	504-B	504-B	504-B	504-B	504-B	504-B			
<b>SATURDAY</b>	CRE-I	PDP		OT TUTE	Library	VAC-1701			
	AB			AKS					
	504-B			504-B					
<b>Name of the Subject</b>			<b>Subject Code</b>	<b>Name of the Faculty</b>		<b>Total No. of Lect./Tut./Practical</b>			
						<b>Lect.</b>	<b>Tut.</b>	<b>Pract.</b>	
Managerial Economics			RAS501	Dr. Shashi Shekar		3	0	0	
Sociology			RAS502	Dr. Archana Gautam		3	0	0	
Chemical Reaction Engineering -I			RCH501	Mr. Anurag Bajpai		4	1	0	
Mass Transfer-II			RCH502	Mr. SANDEEP KUMAR VERMA		4	1	0	
Optimization Techniques			RCH052	Mr. Anoop kumar sengar		4	1	0	
Chemical Technology			RCH503	Mr. Anurag Bajpai/Mr.Lalit Singh Baghel		4	0	0	
CRE Lab			RCH551	Mr. Anurag Bajpai/Mr. Asim shukla		0	0	3	
MT Lab-II LAB			RCH552	Mr. SANDEEP KUMAR VERMA/Mr. Venktesh		0	0	3	
CT LAB			RCH553	Mr. Anurag Bajpai/Mr. Asim Shukla		0	0	2	
Soft Computing Lab			RCH554	Mr. Anoop kumar sengar/Mr. Venktesh		0	0	2	

Mr. Lalit Singh Baghel  
Time Table Incharge

Mr. Anurag Bajpai  
Head of the Department

Head  
Department of Chemical Engg.  
Hindustan College of Science & Technology  
Farah, Mathura

Director  
Hindustan College of  
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# Value added course-1

## Process Equipment Design (VAC-1701)

### UNIT-I

#### INTRODUCTION TO PLANT DESIGN.

#### PROCESS DESIGN DEVELOPMENT:

Design project procedure, design information from the literature, flow diagrams, preliminary design, comparison of different processes, equipment design, scale-up in design. Materials of construction, selection of materials, fabrication of equipment.

Learning Outcomes: After the completion of the Unit I, the student will be able to

1. Discuss the preliminary design of various processes
2. Identify various materials for fabrication of equipment
3. Explain the scale up in design

### UNIT-II

#### MECHANICAL DESIGN OF PROCESS EQUIPMENT:

Pressure vessels – calculation of thickness of cylindrical and spherical shells subjected to internal pressure, heads or covers.

Storage vessels – storage of nonvolatile liquids, storage of volatile liquids, storage of gases. Supports for vessels – bracket or lug supports, leg supports, skirt supports, saddle supports.

Learning Outcomes: After the completion of the Unit II, the student will be able to

1. Identify various stresses acting on the walls of pressure vessels
2. Estimate the thickness of thin walled pressure vessels
3. Calculate the thickness of heads of pressure vessels

### UNIT-III

#### HEAT TRANSFER EQUIPMENT DESIGN:

Design of double pipe heat exchangers, Shell and tube heat exchangers (1-2,2-4), optimum design and heat recovery, selection of suitable heat exchanger.

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Head  
Department of Chemical Engg.  
Hindustan College of Science & Technology  
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*Arav*  
Director  
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Design of single and multiple effect evaporators without boiling point elevation.

Learning Outcomes: After the completion of the Unit III, the student will be able to

1. Identify the purpose of various heat exchangers
2. Estimate the overall heat transfer coefficient for heat exchangers
3. Calculate the area of multiple effect evaporator .

#### UNIT-IV

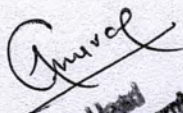
##### **MASS TRANSFER EQUIPMENT DESIGN:**

Finite-stage contactors- bubble cap tray, sieve tray and valve tray units, maximum allowable vapor velocities, plate and column efficiency, other design factors.

Continuous contactors – types of packing, liquid distribution, pressure drop, packing efficiencies. Relative merits of plate and packed towers, selection of contacting equipment.

Learning Outcomes: After the completion of the Unit IV, the student will be able to

1. Select the suitable contactor for a given mass transfer operation
2. Design a packed bed
3. Evaluate the design parameters of tray tower

  
Head  
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# Hindustan College of Science & Technology

Department of Chemical Engineering

Value Added Course - Registration Form

## Process Equipment Design

Session 2018-19

From 14th July, 2018 to 17th Nov, 2018

Sr. No.	Roll No.	Name	Department	Semester	Signature of Student
1	1606451001	ALOK VERMA	Chemical	V	Alok
2	1606451002	AMAN VERMA	Chemical	V	Amn
	1606451003	ARVIND KUMAR	Chemical	V	Arvind
4	1606451004	ARVIND KUMAR MAURYA	Chemical	V	Arvind
5	1606451006	DUSHYANT SINGH RANA	Chemical	V	Dushant
6	1606451008	MANISH KUMAR YADAV	Chemical	V	Manish
7	1606451009	PRAVEEN	Chemical	V	Praveen
8	1606451012	SAUGAT LUITEL	Chemical	V	Saugat
9	1606451013	SHRUTI PAL	Chemical	V	Shruti
10	1606451014	YASHI YADAV	Chemical	V	Yashi
11	1706451905	SURESH KUMAR VERMA	Chemical	V	Suresh
12	1706451904	RITESH MISHRA	Chemical	V	Ritesh
13	1706451906	UDIT SHARMA	Chemical	V	Udit
14	1706451903	RAJESH KUMAR	Chemical	V	Rajesh
15	1706451901	BRAHAM KUMARI SHARMA	Chemical	V	Brahm
16	1706451902	MAN MAHENDRA SINGH	Chemical	V	Manmahendra

*Approval*  
Head  
Department of Chemical Engg.  
Hindustan College of Science & Technology  
Farah, Mathura

*Director*  
Director  
Hindustan College of  
Science & Technology  
FARAH (MATHURA)

# Hindustan College of Science & Technology

Department of Chemical Engineering

Value Added Course - Registration Form

## Process Equipment Design

Session 2018-19 (Odd Sem)

session wise Attendance Sheet

Sl. No.	Roll No.	Name	SEM	Signature of the Student by Session																	
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
				21.07	28.07	04.08	11.08	18.08	25.08												
1	1606451001	ALOK VERMA	V	Alok	Alok	Alok	Alok	A	Alok	Alok	Alok	Alok	A	Alok	Alok	Alok	A	Alok	Alok	Alok	Alok
2	1606451002	AMAN VERMA	V	Aman	Aman	Aman	A	Aman	Aman	Aman	A	Aman	Aman	A	Aman	Aman	Aman	A	Aman	Aman	Aman
3	1606451003	ARVIND KUMAR	V	Arvind	Arvind	Arvind	Arvind	A	Arvind	Arvind	A	Arvind	Arvind	Arvind	Arvind	A	Arvind	Arvind	Arvind	Arvind	Arvind
4	1606451004	ARVIND KUMAR MAURYA	V	Arvind	Arvind	Arvind	Arvind	A	Arvind	Arvind	A	Arvind	Arvind	Arvind	A	Arvind	Arvind	Arvind	Arvind	Arvind	Arvind
5	1606451006	DUSHYANT SINGH RANA	V	Dushyant	Dushyant	Dushyant	A	Dushyant	Dushyant	Dushyant	Dushyant	Dushyant	Dushyant	A	Dushyant	Dushyant	Dushyant	Dushyant	Dushyant	Dushyant	Dushyant
6	1606451008	MANISH KUMAR YADAV	V	Manish	Manish	Manish	Manish	A	Manish	Manish	Manish	Manish	Manish	A	Manish	Manish	Manish	Manish	Manish	Manish	Manish
7	1606451009	PRAVEEN	V	Praveen	Praveen	Praveen	Praveen	A	Praveen	Praveen	Praveen	A	Praveen	Praveen	Praveen	Praveen	A	Praveen	Praveen	Praveen	Praveen
8	1606451012	SAUGAT LUITEL	V	Saugat	Saugat	Saugat	Saugat	A	Saugat	Saugat	Saugat	Saugat	Saugat	A	Saugat	Saugat	Saugat	A	Saugat	Saugat	Saugat
9	1606451013	SHRUTI PAL	V	Shruti	Shruti	Shruti	A	Shruti	Shruti	Shruti	Shruti	Shruti	Shruti	A	Shruti	Shruti	Shruti	Shruti	A	Shruti	Shruti
10	1606451014	YASHI YADAV	V	Yashi	Yashi	Yashi	Yashi	A	A	Yashi	Yashi	Yashi	Yashi	Yashi	A	Yashi	Yashi	A	Yashi	Yashi	Yashi
11	1706451905	SURESH KUMAR VERMA	V	Suresh	Suresh	Suresh	Suresh	A	Suresh	A	Suresh	Suresh	Suresh	Suresh	A	Suresh	Suresh	Suresh	Suresh	Suresh	Suresh
12	1706451904	RITESH MISHRA	V	Ritesh	Ritesh	Ritesh	Ritesh	Ritesh	Ritesh	A	Ritesh	Ritesh	Ritesh	Ritesh	Ritesh	Ritesh	Ritesh	A	A	Ritesh	Ritesh
13	1706451906	UDIT SHARMA	V	Udit	Udit	A	Udit	Udit	Udit	Udit	Udit	Udit	Udit	A	Udit	Udit	A	A	Udit	Udit	Udit
14	1706451903	RAJESH KUMAR	V	Rajesh	Rajesh	Rajesh	Rajesh	A	Rajesh	Rajesh	Rajesh	Rajesh	Rajesh	A	Rajesh	Rajesh	Rajesh	A	Rajesh	Rajesh	Rajesh
15	1706451901	BRAHAM KUMARI SHARMA	V	B.K. Sharma	B.K. Sharma	B.K. Sharma	B.K. Sharma	A	B.K. Sharma	A	B.K. Sharma	B.K. Sharma	B.K. Sharma	B.K. Sharma	B.K. Sharma	B.K. Sharma	A	B.K. Sharma	B.K. Sharma	A	B.K. Sharma
16	1706451902	MAN MAHENDRA SINGH	V	Man Mahendra	Man Mahendra	Man Mahendra	A	Man Mahendra	Man Mahendra	Man Mahendra	Man Mahendra	Man Mahendra	Man Mahendra	A	Man Mahendra	Man Mahendra	Man Mahendra	A	Man Mahendra	Man Mahendra	Man Mahendra

Department of Chemical Engineering  
Hindustan College of Science & Technology  
Farah, Mathura

Director  
Hindustan College of Science & Technology  
FARAH (MATHURA)



HINDUSTAN COLLEGE OF SCIENCE & TECHNOLOGY  
FARAH, MATHURA



*Certificate of Completion*

DEPARTMENT OF CHEMICAL ENGINEERING  
*Academic Session 2018-19*

***This is to certify that Mr. UDIT SHARMA, Roll No: 1706451906 of Course: B. Tech. Chemical Engineering , V semester has successfully completed 30 hours Value Added Course titled "Process Equipment Design" (Course code: VAC-1701).***

Course Coordinator

Head of Department

Director, HCST

Head of Department  
Department of Chemical Engineering  
Hindustan College of Science & Technology  
Farah, Mathura

Director  
Hindustan College of  
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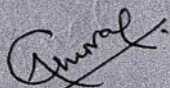
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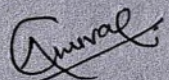


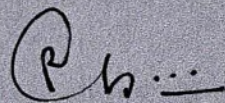
*Certificate of Completion*

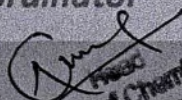
DEPARTMENT OF CHEMICAL ENGINEERING  
*Academic Session 2018-19*

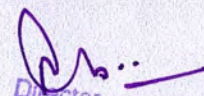
*This is to certify that Ms. SHRUTI PAL, Roll No: 1606451013 of Course: B. Tech. Chemical Engineering , V semester has successfully completed 30 hours Value Added Course titled "Process Equipment Design" (Course code: VAC-1701).*

  
Course Coordinator

  
Head of Department

  
Director, HCST

  
Head of Department  
Department of Chemical Engg.  
Hindustan College of Science & Technology  
Farah, Mathura

  
Director  
Hindustan College of  
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FARAH (MATHURA)