

<b>1. Name of the Faculty : Swapnil Bhurat</b>	<b>Course Code: MEAD 2001</b>
<b>2. Course : Vehicle Technology</b>	<b>L: 4</b>
<b>3. Program : Automotive Design Engineering</b>	<b>T: 0</b>
<b>4. Target : 02</b>	<b>P: 0</b>
	<b>C: 4</b>

### COURSE PLAN

Target	50% (marks)
Level-1	40% (population)
Level-2	50% (population)
Level-3	60% (population)

#### 1. Method of Evaluation

UG	PG
Tests (30%)	Quizzes/Tests, Assignments, seminar (50%)
Mid Examination (20%)	End semester (50%)
End examination (50%)	

\*may be keep as per Program (UG/PG)

#### 2. Passing Criteria

Scale	PG	UG
<b>Out of 10point scale</b>	SGPA – “6.00” in each semester  CGPA – “6.00”  Min. Individual Course Grade – “C”  Course Grade Point – “4.0”	SGPA – “5.0” in each semester  CGPA – “5.0”  Min. Individual Course Grade – “C”  Course Grade Point – “4.0”

\*may be keep as per Program (UG/PG)

#### 3. Pedagogy

- Working animation of different processes.

#### 4. Topics introduced for the first time in the program through this course

- NA

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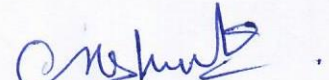
**5. References:**

Text Books	Web resources	Journals	Reference books
Automobile Engineering by Dr. Kirpal Singh. 2. Automobile Engineering by G.B.S. Narang 3. Automotive Mechanics by Crouse Anglin 4. Automobile Technology by Dr. N.K. Giri			1. Advanced Vehicle Technology by Heinz Heisher, 2e, BH Pub 2. Automotive Chassis by Jonsen Reimpell, BH Pub 3. Automotive Science & Mathematics by Allan Bonnick, BH Pub



Signature of HOD/Dean

Date: 15/01/2020

  
Signature of Faculty

Date: 15/1/2020

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### GUIDELINES TO STUDY THE SUBJECT

#### Instructions to Students:

1. Go through the 'Syllabus' in the Black Board section of the web-site (<https://learn.upes.ac.in>) in order to find out the Reading List.
2. Get your schedule and try to pace your studies as close to the timeline as possible.
3. Get your on-line lecture notes (Content, videos) at Lecture Notes section. These are our lecture notes. Make sure you use them during this course.
4. Check your blackboard regularly
5. Go through study material
6. Check mails and announcements on blackboard
7. Keep updated with the posts, assignments and examinations which shall be conducted on the blackboard
8. Be regular, so that you do not suffer in any way
9. **Cell Phones and other Electronic Communication Devices:** Cell phones and other electronic communication devices (such as Blackberries/Laptops) are not permitted in classes during Tests or the Mid/Final Examination. Such devices MUST be turned off in the class room.
10. **E-Mail and online learning tool:** Each student in the class should have an e-mail id and a pass word to access the LMS system regularly. Regularly, important information – Date of conducting class tests, guest lectures, via online learning tool. The best way to arrange meetings with us or ask specific questions is by email and prior appointment. All the assignments preferably should be uploaded on online learning tool. Various research papers/reference material will be mailed/uploaded on online learning platform time to time.
11. **Attendance:** Students are required to have minimum attendance of 75% in each subject. Students with less than said percentage shall NOT be allowed to appear in the end semester examination.

This much should be enough to get you organized and on your way to having a great semester! If you need us for anything, send your feedback through e-mail to your concerned faculty. Please use an appropriate subject line to indicate your message details.

There will no doubt be many more activities in the coming weeks. So, to keep up to date with all the latest developments, please keep visiting this website regularly.

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		<b>C:</b>	<b>4</b>

### RELATED OUTCOMES

#### 1. The expected outcomes of the Program are:

PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics, responsibilities, and norms of the engineering practice.
PO9	Individual and Teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

- |  |                        |
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**4. Co-Relationship Matrix**

Indicate the relationships by 1- Slight (low) 2- Moderate (Medium) 3-Substantial (high)

Program Outcome s	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PS O2	PS O2
CO 1	2	1	1	-	-	2	1	-	1	1	2	2	-	2	1
CO 2	2	1	2	-	1	2	2	-	2	2	2	2	-	3	1
CO 3	2	2	2	-	2	2	2	-	3	2	2	2	-	3	2
CO 4	2	2	3	-	3	2	2	-	3	3	2	2	-	3	2
CO 5	2	2	3	-	3	2	2	-	3	3	2	2	-	3	2
Average	2	1.6	3		3	3	2	-	3	3	3	2		3	2

**5. Course outcomes assessment plan:**

components Course Outcomes	Assignment	Test	Mid Semester	End Semester	Any other
CO 1	✓	✓	✓	✓	NA
CO 2	✓	✓	✓	✓	NA
CO3	✓	✓	✓	✓	NA
CO4	✓	✓		✓	NA
CO4	✓	✓		✓	NA

- |                                 |                                      |                               |
|---------------------------------|--------------------------------------|-------------------------------|
| <b>1. Name of the Faculty :</b> | <b>Swapnil Bhurat</b>                | <b>Course Code: MEAD 2001</b> |
| <b>2. Course :</b>              | <b>Vehicle Technology</b>            | <b>L: 4</b>                   |
| <b>3. Program :</b>             | <b>Automotive Design Engineering</b> | <b>T: 0</b>                   |
| <b>4. Target :</b>              | <b>02</b>                            | <b>P: 0</b>                   |
|                                 |                                      | <b>C: 4</b>                   |

### OVERVIEW OF COURSE DELIVERY/BROAD PLAN OF COURSE COVERAGE


**Course Activities:**

S. No.	Description	Planned			Actual			Remarks
		From	To	No. of Sessions	From	TO	No. of Sessions	
1.	vehicle layouts & frames clutches & gear box	06.01.2020	29.01.2020	11				
2.	front axle and steering system	03.02.2020	20.02.2020	9				
3.	vehicle suspension & wheels and tyres	02.03.2020	30.03.2020	13				
4.	rear axle and final drive line and braking system	1.04.2020	24.04.2020	12				

Total No. of Instructional periods available for the course: Sessions

**Signature of HOD/Dean**

**Date:**

  
**Signature of Faculty**

**Date:**

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SESSION PLAN

UNIT-I : VEHICLE LAYOUTS & FRAMES AND FRAMELESS CAR

		Session Plan				Actual Delivery		
Lect.	Date	Topics to be Covered	CO Mapped	Lect.	Date	Topics Covered	CO Achieved	
1	06.01.2020	Introduction to syllabus of vehicle technology						
2	10.01.2020	Introduction, Classification of Automobiles, Types of Chassis with reference to Frames,	CO1					
3	13.01.2020	Non frames Power Plant Locations and Drive. Anatomy of Car,	CO1					
4	14.01.2020	Types of Cars, manikin, seating position, cargo position, Sections of a car, Grid planes as per SAE J183 and designing with sections	CO1					
5	15.01.2020	Chassis Lab session for the practical Exposure	CO1					

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SESSION PLAN

UNIT-II : CLUTCHES & GEAR BOX

		Session Plan			Actual Delivery		
Lect.	Date	Topics to be Covered	CO Mapped	Lect.	Date	Topics Covered	CO Achieved
6	17.01.2020	Requirements of Clutch, Types of clutches, Friction clutch and its types:	CO2				
7	20.01.2020	Construction and working principles Clutch plates, Clutch operating mechanisms, Clutch materials.	CO2				
8	21.01.2020	Dual clutch , fluid coupling , Chassis Lab session for the practical Exposure	CO2				
9	22.01.2020	Chassis Lab session for the practical Exposure	CO2				
10	24.01.2020	Requirements of Transmissions, Resistance offered by the vehicle & performance curves,	CO2				
11	27.01.2020	Gear box types: sliding mesh, constant mesh,.	CO2				
12	28.01.2020	synchronizing elements and synchromesh gear box	CO2				
13	31.01.2020	Chassis Lab session for the practical Exposure	CO2				



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SESSION PLAN

UNIT-III

Session Plan		Actual Delivery				
Lect.	Date	Topics to be Covered	CO Mapped	Lect. Date	Topics Covered	CO Achieved
14	3.02.2020	Requirements of Front Axle, Types of Front Axle,	CO3			
15	10.02.2020	Front Wheel Geometry- Its Significance with Different Characteristics – Caster, Camber, King-Pin Inclinations, Toe – In , Toe-Out,	CO3			
16	11.02.2020	Correct Steering Angle, the effect of Incorrect Steering Geometry	CO3			
17	12.02.2020	Various steering box used in automobiles	CO3			
18	14.02.2020	Numerical on steering angle/turning radius	CO3			
19	17.02.2020	Numerical on steering angle /turning radius	CO3			
20	18.02.2020	Chassis Lab session for the practical Exposure	CO3			

Date:

Signature of faculty



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**SESSION PLAN**  
**UNIT-IV: VEHICLE SUSPENSION SYSTEMS**

		Session Plan			Actual Delivery		
Lect.	Date	Topics to be Covered	CO Mapped	Lect.	Date	Topics Covered	CO Achieved
21	18.02.2020	Need of Suspension Systems, Different Types, Types of Different Suspension Springs, with their Requirements,	CO3				
22	02.03.2020	Constructional Details and Characteristics of Leaf Spring, Coil Spring and Torsion Bar Spring,	CO3				
23	03.03.2020	Chassis Lab session for the practical Exposure	CO3				
24	03.03.2020	Suspension, Hydro Elastic Suspension,	CO5				
25	09.03.2020	Independent Suspension, Rubber Suspension, Pneumatic Use of	CO4				
27	11.03.2020	Antiroll Bar and Stabilizer Bar, Shock Absorbers-Need, Operating Principles, Different Types	CO4				
28	12.03.2020	Chassis Lab session for the practical Exposure	CO4				

Date:

  
 Signature of faculty

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SESSION PLAN

**UNIT-V: WHEELS AND TYRES**

Session Plan				Actual Delivery			
Lect.	Date	Topics to be Covered	CO Mapped	Lect.	Date	Topics Covered	CO Achieved
29	02.03.2020	Basic Requirements of Wheels and Tyres, Types of Road Wheels, Construction of Wheel Assembly, Wheel Balancing,	CO4				
30	03.03.2020	Tyre Construction, Types-Tubeless, Crossply, Radial Types,	CO4				
31	04.03.2020	Hybrid Tyres, Sizes and Designation, Aspect Ratio, Tyre Tread Pattern and noise generation, Tyre Valve,	CO4				
32	09.03.2020	Tyre Inflation Pressure, Safety Precautions in Tyres ,Tyre Rotation And Matching, Types of Tyre Wear and their Causes,	CO4				
34	11.03.2020	Selection of Tyre under Different Applications, Tyre Retreading-Hot and Cold ,	CO4				
35	23.03.2020	Factors affecting Tyre Performance- effect of camber on types of tyres.	CO4				
36	24.03.2020	Chassis Lab session for the practical Exposure					

Date:

  
Signature of faculty

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4. Target : 02 P: 0
- C: 4

### SESSION PLAN

#### UNIT-VI: REAR AXLE AND FINAL DRIVE LINE

Session Plan				Actual Delivery		
Lect.	Date	Topics to be Covered	CO Mapped	Lect.	Date	Topics Covered
37	25.03.2020	Effect of Driving Thrust and Torque Reactions, Hotch Kiss Drive, Torque Cube Drive and Radius Rods,	CO4			CO4 Achieved
38	27.03.2020	Propeller Shaft, Universal Joint, Front Wheel Drive, Different Types of Final Drive, Double Reduction and Twin Speed Final Drives,	CO4			
39	30.03.2020	Differential Principle, Construction Details of Differential Unit, Non-Slip Differential, Differential Locks, Differential Housings,	CO4			
40	31.03.2020	Construction Rear Axles, Types of Load, Action on Rear Axles, Fully Floating, Three Quarter Floating and Semi-Floating Rear Axles,	CO4			
41	01.04.2020	Rear Axles Housings, Construction of Different Types of Axle Housings, Multi-Axle Vehicles	CO4			
42	03.04.2020	Chassis Lab session for the practical Exposure	CO4			

Date:

  
 Signature of faculty

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- C: 4

SESSION PLAN

UNIT-VII: BRAKING SYSTEMS

Session Plan				Actual Delivery			
Lect.	Date	Topics to be Covered	CO Mapped	Lect.	Date	Topics Covered	CO Achieved
43	07.04.2020	Need, Functions and Requirements of Braking Systems, Drum Brake Arrangements, Disc Brake Arrangement,	CO5				
44	08.04.2020	Brake Friction Material, Hydraulic Brake System and Components, Hydraulic Brake Fluids, Air Brakes, Vacuum Servo Assisted Braking Systems,	CO5				
45	17.04.2020	Parking Brake Systems, Hydraulic Power Brakes, Anti-Lock Braking System (ABS)	CO5				
46	20.04.2020	Test-2	CO5				

Date:

*Swapnil Bhurat*  
Signature of faculty

- |  |                        |
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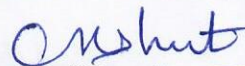
### PERIODIC MONITORING

Actual date of completion and remarks, if any

Components		From	To	From	To	From	To	From	To
Duration (Mention from and to dates)		06.01. 2020	31.01. 2020	01.02. 2020	29.02. 2020	01.03. 2020	31.03. 2020	01.04. 2020	30.04. 2020
Percentage of Syllabus covered									
Lectures	Planned	12		10		08		06	
	Taken								
Tutorials	Planned	NA	NA	NA	NA	NA	NA	NA	NA
	Taken	NA	NA	NA	NA	NA	NA	NA	NA
Test/quizzes	Planned	No		01		No		01	
	Taken	No				No			
	CO's Addressed								
	CO's Achieved								
Assignments	Planned	01		No		01		No	
	Taken			No		01		No	
	CO's Addressed								
	CO's Achieved								
Signature of Faculty									
Head of the Department									
A.M.R.C									

Signature of HOD/ Dean

Date


 Signature of Faculty

Date

- |   |                               |
|---|-------------------------------|
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|   | <b>C: 4</b>                   |

**INDIRECT ASSESSMENT**

**Sample format for Indirect Assessment of Course outcomes:**

NAME:
ENROLLMENT NO:
SAP ID:
COURSE:
PROGRAM:

Please rate the following aspects of course outcomes of -----.

Use the scale 1-3\*

course Outcomes	Statement	1	2	3
CO1	Develop the vehicle chassis layouts for frame as well as non-frame based vehicles			
CO2	Identify the different constructional and working principles clutches and Gear boxes			
CO3	Analyze the Front Axle and Steering systems of a typical Automobile			
CO4	Evaluate different types of suspension systems, Wheels & Tyres as per vehicles requirement			
CO5	Classify the different types of rear axle along with final drive, differential along with braking systems of different Automotive			

\*

1

WEAK

2

MODERATE

3

STRONG

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### **INSTRUCTIONS FOR FACULTY**

#### **Instructions for faculty**

- Faculty should keep track of the students with low attendance and counsel them regularly.
- Course coordinator will arrange to communicate the short attendance (as per UPES policy) cases to the students and their parents monthly.
- Topics covered in each class should be recorded in the table of RECORD OF CLASS TEACHING (Suggested Format).
- Internal assessment marks should be communicated to the students twice in a semester.
- The file will be audited by respective Academic Monitoring and Review Committee (AMRC) members for theory as well as for lab as per AMRC schedule.
- The faculty is required to maintain these files for a period of at least three years.
- This register should be handed over to the head of department, whenever the faculty member goes on long leave or leaves the Colleges/University.
- For labs, continuous evaluation format (break-up given in the guidelines for result preparation in the same file) should be followed.
- Department should monitor the actual execution of the components of continuous lab evaluation regularly.
- Instructor should maintain record of experiments conducted by the students in the lab weekly.
- Instructor should promote students for self-study and to make concept diary, due weightage in the internal should be given under faculty assessment for the same.
- Course outcome assessment: To assess the fulfilment of course outcomes two different approaches have been decided. Degree of fulfillment of course outcomes will be assessed in different ways through direct assessment and indirect assessment. In Direct Assessment, it is measured through quizzes, tests, assignment, Mid-term and/or End-term examinations. It is suggested that each examination is designed in such a way that it can address one or two outcomes (depending upon the course completion). Indirect assessment is done through the student survey which needs to be designed by the faculty (sample format is given below) and it shall be conducted towards the end of course completion. The evaluation of the achievement of the Course Outcomes shall be done by analyzing the inputs received through Direct and Indirect Assessments and then corrective actions suggested for further improvement.





Year: 2019-2020  
Semester: VIII

Course Code: MEAD 2001

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L: 4  
T: 0  
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C: 4

Planning for Remedial Classes

Sl. No.	Name of Student	Roll No.	Sap ID	Mid Sem Marks	Remedial Classes Held			Class test on the basis of Remedial Classes	End Sem Marks	Improvement (Y/N)
					Date	Venue	Time			

Signature of HOD/ Dean  
Date

Signature of Faculty  
Date