BITS Pilani K.K. Birla Goa Campus
Center for Technical Education
Semester I 2018-19
Course Handout

Course Name: Vehicle Dynamics and Design
Instructors/Mentors: Utkarsh, Priyanshu, Aakash, Krishna, Kedar, Aman, Akash, Prakhar

Scope and Objective: This course is designed to give an idea of how a vehicle will respond to various situations. As automobiles evolved the understanding of vehicle dynamics became important. Subsequently it has moved towards modeling, analysis, and optimization of multi-body dynamics with accurate positioning, sensing, and calculations with intelligent computer softwares.

A clear understanding Vehicle Dynamics is needed for predicting behaviour of any vehicle under different conditions. Responses of components and intuitive feedback to driver governs safety and handling in general. Also, dynamics of a vehicle can be the deciding factor in any competitive event.

Keeping this in mind our SAE Club members have designed this course catering to every need. On completion this certified course, one will have a complete understanding of Vehicle Dynamics enabling them to build advanced automobiles or competition specific vehicles.

Basically, if you are interested to learn how to design a car from scratch, this is the course of you.

New Additions to the course:
-How different subsystems are dependent on each other for efficient working
-Frequent visits to workshop to see the practical applications and models of different parts.
 -Live demo of vehicle optimization process using different softwares like Msc Adams, Lotus.

Textbooks
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    TB01: Tune to Win, Carol Smith

    TB02: Fundamentals of Vehicle Dynamics, Thomas D. Gillespie

    TB03: Chassis Design, Wakeman

    TB04: Electronic Engine Controls, Steve V. Hatch

References:

    RB01: Race Car Vehicle Dynamics, Milliken and Milliken

    RB02: Internal Combustion Engines, V Ganesan

    RB03: Introduction to Arduino, Jeremy Blum

    RB04: Suspension Geometry and Computation, John C. Dixon

Course Structure:

Lecture No.	Learning Objective	Reference
1.	Introduction to Course, Expectations from the Students and distribution of course material	
2.	Engines: Types of Engines, Fundamentals of IC Engines	TB1,2,
3.	Transmissions: Types and functioning, use of differentials	TB1,2;RB02
4.	Tires: How do they do it? Fabrication, Traction and Rolling Resistance	TB1,2 Class Notes
5.	Chassis: Need, Types and Functioning	TB3
6.	Introduction to Vehicle Suspension, Different types of suspension and Basic terminology	TB2 RB4
7	Ride and Vehicle Dynamics	Class Notes
8	Steering System: Basics and Cornering Force Equations	TB2
9	Braking System and Dynamics	TB2
10	Introduction to Arduino Code Engine Electronics and Sensors Data Acquisition System	TB4 RB3

Evaluation Scheme:

Components	Duration	Weightage	Date/Time	Remarks
Mid-sem	60 mins	35	TBA	CB
Quiz/Assignment	-	25	Surprise	CB
End-sem	90 mins	40	TBA	CB

NOTES:

1. Ample doubt clearing sessions will be kept between the above-mentioned schedules to give student enough time to grasp the concept clearly.
2. Class Timing and Venue will be announced shortly.
3. All notices related to the course will be put up on the google group for this course.
4. Make up will be granted under extreme circumstances only.

Instructor in charge
VDD