

# BMA4723 VEHICLE DYNAMICS

## Ch4 Vehicle Equation of Motions

by

Mohamad Heerwan Bin Peeie  
Faculty of Mechanical Engineering  
[mheerwan@ump.edu.my](mailto:mheerwan@ump.edu.my)

# Quiz Description

- Aims
  - Determine the acceleration of the vehicle at the longitudinal and lateral axis.
- Expected Outcomes
  - Students are able to determine the acceleration of the vehicle at the longitudinal and lateral axis by using equations of motion.
- References
  - M.Abe, Vehicle Handling Dynamics Theory and Application, Second Edition, Published by Elsevier Ltd, 2015
  - Thomas D.Gillespie, Fundamental of Vehicle Dynamics, Published by Society of Automotive Engineers

# Question 1

- Determine the acceleration of the vehicle at  $x$ -axis.
- Given: Force at the front tire = 1500N, Force at the rear tire, 1200N, load of the vehicle 1200N, steer angle of the vehicle is 0 degree.

## Question 2

- Determine the acceleration of the vehicle at  $y$  axis.
- Given: Longitudinal force at the front tire = 1500N, Longitudinal Force at the rear tire, 1200N, Lateral force at the front tire = 800N, Lateral force at the rear tire = 650N, load of the vehicle 1200N , steer angle of the vehicle is 5 degree, longitudinal velocity = 8 m/s and yaw rate = 1.4 rad/s.

# Vehicle Dynamics

## Chapter 4

Dr Mohamad Heerwan Bin Peeie