Hanze

Course: Dynamics — credits: 5

Course code	WBVP24DYN
Name	Dynamics
Study year	2026-2027
ECTS credits	5
Language	Dutch, with parts in English
Coordinator	M.J. Kroes
Modes of delivery	Education
Assessments	Dynamics - Written, organised by STAD examinations Mathematics - Assignment

Learning outcomes

The student:

- using a methodical approach¸ determines the acceleration, velocity and distance travelled for the motion of a point mass and/or a rigid body in the plane. This should make use of available kinematic equations. The main emphasis here is on a methodical approach. The result is a clearly documented calculation
- relates the acceleration of a point mass and/or a rigid body in the plane to the forces and torques. This should make use of the available equations of motion to ultimately calculate the unknown forces/torques and/or accelerations. The emphasis here is on a methodical approach. The result is a clearly documented calculation based on a VLS and KS
- applies the principle of ‘work and energy’ and the ‘law of conservation of mechanical energy’ to issues involving the search for a relationship between external forces, velocities and distance travelled. The unknown data must be calculated. The main emphasis here is on a methodical approach. The result is a clearly documented calculation based on a VLS of a point mass moving in the flat plane that
- determines the required mechanical power and efficiency for the movement of a point mass and/or rigid body in the plane. The main emphasis here is on a methodical approach. The result is a clearly documented calculation.
- determines the derivative of various functions, graphs it and applies it in determining extremes.
- determines the primitive of various functions, applies it in calculating areas and contents of revolutionary bodies.

Content

- Apply kinematic equations that describe the motion of a point mass or a rigid body in the plane;
- Determine the relationship between distance traveled, velocity and acceleration by means of differentiation and integration;
- Draw up a Free Body Diagram (FBD) and a Kinetic Diagram (KD);
- Draw up the laws of motion to determine the relationship between forces/moments and (angular) acceleration;
- Determine the work done by a force;
- Apply the Principle of Work and Energy;
- Determine the kinetic energy of a point mass or a rigid body;
- Determine the potential energy of a point mass or a rigid body;
- Apply the law of conservation of energy;
- Calculate the mechanical power required for the motion of a particle or rigid body;
- Determining the derivatives of a number of standard functions.
- Applying the sum rule, the product rule, the quotient rule, and the chain rule when differentiating other functions.
- Determining stationary points and inflection points of functions and using a sign diagram to ascertain the nature of a stationary point, i.e., whether it is a maximum, a minimum, or an inflection point.
- Determining indefinite integrals.
- Calculating definite integrals.
- Computing areas and volumes of solids of revolution using integrals.

Included in programme(s)

Mechanical Engineering

School(s)

Engineering, Life Sciences & ICT

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