Dynamics

Code: MK3MEC4S4SX17-EN

ECTS Credit Points: 4

Evaluation: Exam

Year, Semester: 2nd year, 4th semester

Its prerequisite: Civil Engineering Orientation

Further courses are built on it: No

Number of teaching hours/week (lecture + practice): 0+4

Topics:

Introduction. Kinematics of particles. Kinematics of rigid bodies. Kinetics of particles. Newton's second law of motion. Application of principle of impulse and principle of work and energy for analysis of motion on a given motion curves. Kinetics of rigid bodies. Problems of impacts. Impact of falling mass and elastic structure (solid body). Free, and forced vibration problems with one degree of freedom. Free and forced vibration problems with more degrees of freedom. Vibration forced by support motion. Vibration from earthquake. Dynamic effects of wind.

Literature:

Compulsory:

- BEER F.P., JOHNSTON E.R.: Dynamics. ISBN 0-07-079926-1, McGraw-Hill cop 1988.

Recommended:

- TIMOSHENKO S.: Vibration problems in engineering. ISBN 0-471-87315-2, Wiley 1974.
- PESTEL E. C., THOMSON W. T.: Dynamics. McGraw-Hill cop 1968.
- HARRIS C. M., CREDE C. E.: Shock and vibration handbook. ISBN: 0-07-026801-0 McGraw-Hill cop 1988.

Schedule

1st week Registration week	
2nd week **Practice: :** Introduction, Kinematics of particles, Moving in 3D	**3rd week:** **Practice:** Kinematics of rigid bodies Translation, Rotation around fix axis, planar moving
4th week: **Practice:** Kinetics of particles I Newton's second law Theorem of D' Alambert	**5th week:** **Practice:** Kinetics of particles II Theorem of change of linear momentum Theorem of change of angular momentum
6th week: **Practice:** Kinetics of particles III Work of a force Theorem of change of kinetic energy Force field, Potential energy, Law of conservation of mechanical energy **Mid-term test**	**7th week:** **Practice:** Trip.
8th week: 1st drawing week	
9th week: **Practice:** Kinematics of rigid bodies I Second order moment of mass Principles of rigid bodies kinetics	**10th week:** **Practice:** Kinematics of rigid bodies II Linear momentum of a rigid body Angular momentum of a rigid body

11th week: **Practice:** Impacts	**12th week:** **Practice:** Vibration I Free vibration of S-DOF systems
13th week: **Practice:** Vibration II Forced vibration of S-DOF systems	**14th week:** **Practice:** Vibration III Vibration of M-DOF systems **End-term test**
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation at **practice** is compulsory. Students must attend practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Students can't make up a practice with another group. Attendance at practice will be recorded by the practice leader. Being late is counted as an absence. In case of further absences, a medical certificate needs to be presented. Students are required to bring a calculator to each practice class. Active participation is evaluated by the teacher in every class. If a student's behaviour or conduct doesn't meet the requirements of active participation, the teacher may evaluate his/her participation as an absence due to the lack of active participation in class.

During the semester there are two tests: the mid-term test in the 6th week and the end-term test in the 14th week. A student once can retake the test in both topics, if it is necessary.

Tests:

Test 1:		Maximum:	**25 points**
Test 2:		Maximum:	**25 points**
	Summa: **50 points**	Minimum:	**33 points**
	50×1.5=75 points		**50 points**

B, for a grade:

The course ends in an **examination grade** based on the points of the tests and the exam. The sum points which are given for the two tests is multiplied with 1.5 and added to the points of the exam.

Exam	Maximum:	**25 points**	Minimum:	**10 points**
Summa points	Maximum:	**100 points**	Minimum:	**60 points**

A grade is given according to the following table:

Score	Grade
0-59	fail (1)
60-69	pass (2)
70-79	satisfactory (3)
80-89	good (4)
90-100	excellent (5)