

<p>Kingdom of Saudi Arabia Ministry of Higher Education Qassim University College of Engineering</p>		<p>المملكة العربية السعودية وزارة التعليم العالي جامعة القصيم كلية الهندسة</p>
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Dynamics of Mechanical Systems

College: Engineering

Department: Mechanical

First: Course Definition

1- Course Code: ME 664

2- Units: 3 credit hrs

3 – Semester

4 -Prerequisite Undergraduate course in mechanics of machinery

5- Co-requisite

6- Location (if not on main Campus):

Second: Course Objectives

1. To present to the students the basic principles of dynamics in an advanced and rigorous manner.
2. To teach the use of a simulation software (e.g., Simulink) to model and solve dynamics problems.
1. To teach the use of analytical methods in modeling and solution of dynamics problems.

Third: Course Specifications

1- Topics to be covered		
Subject	No of Weeks	Units
Introduction. Fundamental principles.	2	6
Equations of motion using Newton's laws.	2	6
Work-energy principle.	2	6

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Simulation of dynamical systems	2	6
Kineto-static and time response analysis	2	6
Principle of virtual work	1	3
Potential energy principle	1	3
Lagrange's equations	2	6
Hamilton's principle	1	3

2- Course components (Total hrs in the Semester)

Lecture	Exercise or lab	Other
45	---	--

3- Intended Learning Outcomes of the Course (ILO's)

a. Knowledge

i) Description of the knowledge to be acquired:

Fundamental laws of dynamics applied to particles, bodies and multibody systems, including:

- Newton's laws and D'Alembert's principle.
- Virtual work and potential energy principles
- Lagrange and Hamilton's principles

ii) Teaching strategies to be used to develop that knowledge

- Class lectures
- Group Discussion
- Homework

iii) Methods of assessment of knowledge acquired

- Quizzes
- Exams

b- Cognitive (Intellectual) Skills

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i) Cognitive skills to be developed

- Ability to prepare a dynamic model of a real system using relevant laws.
- Ability to solve the resulting equations using exact and approximate methods.
- Ability to interpret the solution of the dynamic equations of motion.

ii) Teaching strategies to be used to develop these cognitive skills

- Class lectures and presentations
- Homework problems

iii) Methods of assessment of students' cognitive skills

- Quizzes and homework
- Term projects
- Exams

c. Interpersonal Skills and Responsibility

i) Description of the interpersonal skills and capacity to carry responsibility to be developed

- Ability to work in a team
- Ability to meet assigned deadlines

ii) Teaching strategies to be used to develop these skills

- Group discussions and projects
- Class attendance requirements, homework deadlines, and general class discipline

iii) Methods of assessment of students' interpersonal skills and capacity to carry responsibility

- Observation of student contribution in group discussions and group projects.
- Record of attendance, homework timeliness and class behavior.

d. Communication, Information Technology and Numerical Skills

i) Description of the skills to be developed in this domain

- Ability to communicate the material learned
- Ability to use specialized computer software (e.g., Simulink) for simulating the behavior of complex dynamic systems
- Ability to search for information using the internet

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<p>ii) Teaching strategies to be used to develop these skills</p> <ul style="list-style-type: none"> - Student presentations - Home assignments involving use of computers and internet resources <p>iii) Methods of assessment of students numerical and communication skills</p> <ul style="list-style-type: none"> - Exams - Performance in class discussions/project. <p>e. Psychomotor (if applicable) & Other Non-cognitive Skills Not applicable</p>
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<p>i) Description of the psychomotor or other skills to be developed and the level of performance required</p>

<p>ii) Teaching strategies to be used to develop these skills-</p>

<p>iii) Methods of assessment of student's psychomotor skills</p>
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4- Student Assessment Schedule

Serial	Assessment tool (test, group project, examination etc.)	Week due	Weight
1	Homework & Quizzes	Every week	15%
2	Term project	15 th	10%
3	Midterm exam	7 th	25%
4	Final exam	16 th	50%
5			

5- Student Support

<ul style="list-style-type: none"> - Regular office hours - Electronic copies of books and online resources - Specialized software

6- Learning Resources

<p>i) Essential Books (References)</p>

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- Marcelo R. M. Crespo da Silva, Intermediate Dynamics, McGraw Hill
- Erdman and Sandor, Mechanism Design, Analysis & Synthesis (Vols. I and II), Prentice Hall

ii) Course Notes

iii) Recommended Books

- Gennady Leonov, Henk Nijmeijer, Alexander Pogromsky, Dynamics And Control Of Hybrid Mechanical Systems, World Scientific Publishing Company, 2010

iv) Electronic Books & Web Sites:

v) Periodicals

7- Course Evaluation and Improvement Processes

i) Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- Informal discussion with students
- Student survey at the end of course

ii) Other Strategies for Evaluation of Teaching by the Instructor or by the Department

- Student performance in homework and quizzes

iii) Processes for Improvement of Teaching

- Self-assessment by the instructor
- Feedback from Department Chairman and Vice Dean Academics, as required

iv) Processes for verifying standards of student achievement (e.g. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution)

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v) Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

- Courses are reviewed by relevant subject committees and the department and college councils.