OBR	
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Ohio Articulation Number (OAN)
Course Submission Form
2005-2006

College/University Lakeland Community College

Course(s) Submitted(Title & Course #) Dynamics ENGS 2020 for
Ohio Articulation Number OES 003

Date 9/16/2005

Name and title of individual submitting on behalf of the college/university

Name Marilyn S. Jones Title Associate Provost

Address Kirtland, Ohio 44094

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Credit Hours 3 qtr _____ sem X
Lecture Hours 3
Laboratory Hours _____ (if applicable)
Pre-Requisites(s) Course work (if applicable)
ENGS 2010

Placement Score (if applicable)
(Name of test)
(Domain) (Score)

Catalog/Course Description (Includes Course Title and Course #)

ENGS 2020 Dynamics: This course introduces students to the motion of particles and rigid bodies
subjected to unbalanced force systems; the kinematics of plane motion,
relative motion, and Coriolis acceleration; the concepts of force, mass and
acceleration; and work, energy, impulse and momentum.

Texts/Outside Readings/Ancillary Materials

No text required

Course Objectives and/or Plan of Work

GENERAL COURSE GOALS:

Introduce students to the engineering applications of the dynamics branch of Mechanics.

COURSE OBJECTIVES:

Upon completion of the course, the student should be able to:

Using Rectilinear or Curvilinear Coordinates:

1. Given a system having unbalanced forces, recall and apply equations of kinematics and dynamics to solve for unknown forces and motions. Apply the equations of friction as required.

2. Given a system experiencing variable acceleration, solve for unknown elements of motion through the correct application of motion diagrams.

3. Recognize under what conditions Coriolis acceleration exists in systems in motion.

4. Given a table of formulas for calculating mass moment of inertia, determine the moment of inertia of any composite geometrical body having known dimensions.

5. Given a body experiencing plane motion, determine unknown forces and motions by any of the following three methods:
   a. Plane motion treated as a combination of translation and rotation;
   b. Plane motion treated as rotation about the instantaneous center;
   c. Inertial force at the center of percussion

6. Apply valid checking procedures to all problem solutions to verify the correctness of answers.

Description of Assessment and/or Evaluation of Student Learning

SUGGESTED GRADING PROCEDURES:

Homework	20%
Tests (3 min)	50%
Final	30%

Master Syllabi and Working Syllabi (if both are used)

LAKELAND COMMUNITY COLLEGE - COURSE OUTLINE FORM

ORIGINATION DATE: 08/02/99 APPROVAL DATE: / /
LAST MODIFICATION DATE: 11/16/00 EFFECTIVE TERM/YEAR: FALL 2000

PRINTED: 09/16/05
COURSE NUMBER: ENGS2020
COURSE TITLE: Dynamics

	LECTURE	LAB	CLINICAL	TOTAL	OBR MIN	OBR MAX
CREDITS:	3.00	0.00	0.00	3.00	3.00	3.00
CONTACT HOURS:	3.00	0.00	0.00	3.00		

PREREQUISITES:
ENGS2010

PROGRAMS & CERTIFICATES FOR WHICH THIS COURSE IS REQUIRED:
NONE

PROGRAMS & CERTIFICATES FOR WHICH THIS COURSE IS AN ELECTIVE:
NONE

COURSE ACCEPTED AS TRANSFER CREDIT BY:

RECOMMENDED CLASS SIZE: 16 RATIONALE: DEPARTMENT STANDARD

FREQUENCY OF OFFERING: 2 X YEAR
TERMS NORMALLY OFFERED: FALL SPRING

LAB FEE: NONE

RATIONALE FOR COURSE:
Students interested in transferring to a B.S. program in Engineering should take this sophomore level course prior to transferring.

COURSE DESCRIPTION:
This course introduces students to the motion of particles and rigid bodies subjected to unbalanced force systems; the kinematics of plane motion, relative motion, and Coriolis acceleration; the concepts of force, mass and acceleration; and work, energy, impulse and momentum.

GENERAL COURSE GOALS:
Introduce students to the engineering applications of the dynamics branch of Mechanics.

COURSE OBJECTIVES:
Upon completion of the course, the student should be able to:

Using Rectilinear or Curvilinear Coordinates:

1. Given a system having unbalanced forces, recall and apply equations of kinematics and dynamics to solve for unknown forces and motions. Apply the equations of friction as required.

2. Given a system experiencing variable acceleration, solve for unknown elements of motion through the correct application of motion diagrams.

3. Recognize under what conditions Coriolis acceleration exists in systems in motion.

4. Given a table of formulas for calculating mass moment of inertia, determine the moment of inertia of any composite geometrical body having known dimensions.

5. Given a body experiencing plane motion, determine unknown forces and motions by any of the following three methods:
   a. Plane motion treated as a combination of translation and rotation;
   b. Plane motion treated as rotation about the instantaneous center;
   c. Inertial force at the center of percussion

6. Apply valid checking procedures to all problem solutions to verify the correctness of answers.

COURSE OUTLINE:

I. Introduction to Dynamics
- A. Derivatives of Vector Functions
- B. Position, Velocity, and Acceleration of a Point
- C. Newtonian Mechanics

II. Dynamics of a Particle: Rectangular Coordinate System
- A. Kinematics--Rectangular Coordinates
- B. Equations of Motion
- C. Force-Mass-Acceleration Method; Mass-Acceleration Diagrams
- D. Dynamics of Rectilinear Motion
- E. Superposition of Rectilinear Motions
- F. Motion Diagrams by the Area Method

III. Particle Motion: Curvilinear Coordinates
- A. Kinematics: Path (Normal-Tangential) Coordinates
- B. Kinematics: Polar and Cylindrical Coordinates
- C. Force-Mass-Acceleration Method: Curvilinear Coordinates

IV. Work-Energy and Impulse-Momentum Principles for a Particle
- A. Work of a Force
- B. Principle of Work and Kinetic Energy
- C. Conservative Forces and the Conservation of Mechanical Energy
- D. Power and Efficiency
- E. Principle of Impulse and Momentum
- F. Principle of Angular Impulse and Momentum

V. Dynamics of Particle Systems
- A. Kinematics of Relative Motion
- B. Kinematics of Constrained Motion
- C. Equations of Motion of the Mass Center
- D. Work-Energy Principles
- E. Principle of Impulse and Momentum
- F. Principle of Angular Impulse and Momentum
- G. Plastic and Elastic Impact
- H. Impulsive Motion

VI. Planar Kinematics of Rigid Bodies
- A. Rotation About a Fixed Axis
- B. Kinematics of Plane Motion
- C. Method of Relative Velocity
- D. Instant Center for Velocities
- E. Method of Relative Acceleration
- F. Absolute and Relative Derivatives of Vectors
- G. Motion Relative to a Rotation Reference Frame

VII. Planar Kinetics of Rigid Bodies: Force-Mass-Acceleration Method
- A. Mass Moment of Inertia; Composite Bodies
- B. Angular Momentum of a Rigid Body; Plane Motion
- C. Equations of Plane Motion
- D. The FBD-MAD Technique

E. Differential Equations of Motion

VIII. Planar Kinetics of Rigid Bodies: Work-Energy and Impulse-Momentum Methods

A. Work-Energy Method
1. Work and Power of a Couple
2. Kinetic Energy of a Rigid Body in Plane Motion
3. Work-Energy Principle and Conservation of Mechanical Energy

B. Impulse-Momentum Method
1. Momentum of a Rigid Body in Plane Motion
2. Impulse-Momentum Principles
3. Rigid-Body Impact

INSTRUCTIONAL PROCEDURES THAT MAY BE UTILIZED:
Lecture

SUGGESTED GRADING PROCEDURES:

Homework	20%
Tests (3 min)	50%
Final	30%

SUGGESTED COURSE EVALUATION PROCEDURE:
Use of student evaluations and Biennial Review by the Engineering Technology Division Dean.

[End of Course Outline for 'ENGS2020']

Additional Documentation

OBR Use	Action
Approved	
Additional Information Requested	
Rejected	
Date	

Ohio Articulation Number Form Directions

This form is each institution's OAN course information. This information will be submitted to the Ohio Board of Regents, as part of the faculty review process for each OAN within a given TAG. This document is a locked form, so the only fields that need to be filled in can be opened. When you open this document, make sure the top of the screen, where the name of the document is displayed, says "Document1". The file can be saved in a Word folder or to your desktop and it creates a blank template to fill in. Please fill it in with as much of the requested information as possible. All of the fields in this document are expandable, and will adjust to fit as many characters as you need. Each field is design to accept cut and pastes from other document sources that you may have on campus.

Once you are done filling in your course information, you need to save this file. Since the Word document opened a blank version of this file, you will need to rename is it to save it. Under file, choose "Save as" and then input the name of the file. The naming scheme for this form is Institution-Year-OAN number-Course Title and Number.

Example, if you were ABC Community College, and you were submitting your Calculus I - Math110 course, the name of the file would be ABC-2005-OMT005-Calculus I-Math110. If two (or more) courses are required to fulfill that same OAN, you would submit ABC-2005-OMT005-Calculus I MTH 110 - Calculus II Math 111, and so on for multiple submissions.

When you are done with your submissions, please send them electronically to the Ohio Board of Regents so we can keep your information on file. Please send these to Ora McRae at omcrae@regents.state.oh.us .