ENS 204 Mechanics

Summer 2020

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Availability: Monday-Friday 18.30-20.00 (subject to availability), Zoom, e-mail.
TAs:

Text: Vector Mechanics for Engineers: Statics and Dynamics, Beer and Johnston, E-book.

Prerequisites: NS101, MATH101 and MATH102

Grading: 3 Exams 60% (as online Zoom meeting closed book and notes), Attendance 40% (my personal impression, attendance to zoom meeting, based on exercises in recitations, hws and class problems)

Course Description: ENS204 (a three credit course) is designed for sophomore students to give an introduction to vector mechanics. The following topics will be covered: 1- Statics of Particles, 2-Equilibrium of Rigid Bodies, 3- Analysis of Structures, 4- Forces in Beams, 5- Kinetics and Kinematics of Particles

Learning Objectives:

- Students will be able to draw a two- and three-dimensional free-body diagram for a given mechanical system.
- Students will be able to determine forces at identified points in the system for a two- and three-dimensional mechanical system at equilibrium.
- Students will be able to determine the motion of particles when the forces and masses in a mechanical system are known.
- Students will be able to generate solutions by identifying appropriate methods and applying relevant problem solving principles for engineering problems.

Learning Outcomes:

- Students will be able to apply the fundamentals of mechanics to the design and evaluation of mechanical systems.
- Students will be able to utilize basic calculus and physics for solving engineering problems and use appropriate software to complete the solutions.
- Students will be able to apply the learning objects to real engineering problems.

Required Procedure for the Solution of Engineering Problems (and also in all the quizzes and exams in this class):

1. GIVEN - State briefly and concisely (in your own words) the information given.

2. FIND - State the information that you have to find.

3. DIAGRAM - A drawing showing all quantities involved should be included. Free-body diagrams are drawn separately. Label appropriate coordinate directions.

4. BASIC LAWS - Give appropriate mathematical formulation of the basic laws that you consider necessary to solve the problem.

5. ASSUMPTIONS - List the simplifying assumptions that you feel are appropriate in the problem.

6. ANALYSIS - Carry through the analysis to the point where it is appropriate to substitute numerical values.

7. NUMBERS - Substitute numerical values (using a consistent set of units) to obtain a numerical answer. The significant figures in the answer should be consistent with the given data.

8. CHECK - Check the answer and the assumptions made in the solution to make sure they are reasonable. Check the units, if appropriate.

9. LABEL - Label the answer (e.g., underline it or enclose it in a box).

IMPORTANT:

This solution procedure is **required**. Otherwise **50%** percent of the points for obtained grade were deducted. **Always bring a calculator to the exam and recitations.**

Co-operation on coursework:

It is encouraged to discuss with classmates, use texts, library materials, and other sources while doing any assignment. If a solution to a problem is found in the literature, students must provide correct citations to that literature. For the assignments, every student is expected to have worked **through his/her own analysis and to have written up his/her own work for submission**. Under no circumstances is it permitted to present another student's work as one's own. **Cheating and plagiarism will not be tolerated. These activities will result in students receiving a failing grade in the course.**

Grade Appeal:

Students are encouraged to discuss their grades with the instructor as frequently as needed and to seek assistance at any time from either the instructor or TA. Appeals should be made within

one week of the return of the quiz or exam. Grade appeals should first be directed to the instructor.

Makeup Policy:

Course Outline (Subject to change)

Week	**Subjects**	**Text Reference**
1	INTRODUCTION + STATICS OF PARTICLES	Ch. 1 and Chp. 2
1-2	RIGID BODIES: EQUIVALENT SYSTEMS OF FORCES	Ch. 3
2-3	EQUILIBRIUM OF RIGID BODIES	Ch. 4
3-4	DISTRIBUTED FORCES: CENTROIDS AND CENTERS OF GRAVITY	Ch. 5
4-5	ANALYSIS OF STRUCTURES	Ch. 6
5-6	FORCES IN BEAMS	Ch. 7
6-7	KINEMATICS OF PARTICLES	Ch. 11
7	KINETICS OF PARTICLES: NEWTON'S SECOND LAW	Ch. 12
7	KINETICS OF PARTICLES: ENERGY AND MOMENTUM METHODS	Ch. 13