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Faculty of Engineering

GNG 1105 C ENGINEERING MECHANICS

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Course Text: Engineering Mechanics, 10th Edition in SI Units, by Beer and Johnston. It is published by McGraw-Hill (It is a custom publication for University of Ottawa which includes the whole Statics textbook and the first two chapters of the Dynamics one). Earlier editions of this text contain the same text material, but different problems. Problems for assignments and tutorials will be taken from the current edition.

OUTLINE OF COURSE MATERIAL

1. Introduction	1.1-1.5
2. Statics of Particles	
2.1 Addition of Forces	2.1-2.8
2.2 Equilibrium of a Particle	2.9-2.11
2.3 Forces in Three Dimensions	2.12-2.15
3. Statics of Rigid Bodies	
3.1 Principle of Transmissibility of a Force	3.1-3.3
3.2 Moment of a Force	3.4-3.8
3.3 Moment of a Couple	3.12-3.18
3.4 Equilibrium of a Rigid Body	4.1-4.4, 4.5, 4.6, 4.8-4.9
3.5 Centre of Gravity	5.1-5.5
4. Structures	
4.1 Trusses	6.1-6.5, 6.7
4.2 Frames and Machines	6.9-6.12
5. Friction	
5.1 Static Friction	8.1-8.5
6. Dynamics of Particles	
6.1 Rectilinear Motion	11.1-11.6
6.2 Curvilinear Motion	11.9-11.12
6.3 Forces, Momentum and Angular Momentum	12.1, 12.2, 12.5

COURSE REQUIREMENTS

Objectives:

This course will introduce you to the basic principles of engineering mechanics. Most of this course - sections 1 to 5 above - is concerned with the calculation of forces acting on static (i.e. non-moving) objects and structures. The last part of the course deals with dynamics - determining how objects move under the action of forces. Calculation of forces is a basic step in the design of anything that has to bear a load, whether it is a bridge (CVG), machine, vehicle (MCG), reactor vessel (CHG), or an electronic component (ELG). The dynamic response of systems to forces is an essential part of designing moving machines (MCG), robots (MCG, ELG, CEG, SEG), and control systems (MCG, CHG, ELG, SEG), as well as in the analysis of the flow of liquids, gases and two-phase mixtures (CHG, MCG, CVG). As you will see from the problems covered in your textbook, the material in this course can be applied directly to a wide range of practical problems in every field of engineering and in everyday life. There are three main objectives of this course:

1. To be able to **calculate forces** on objects and in simple structures;
2. To be able to draw a **free-body diagram** of a structure or part of a structure (this is actually a pre-requisite to calculating forces, and an essential skill to learn);
3. To be able to **calculate the motion** of a simple object under an applied force.

Two further, secondary objectives can be added to these:

4. To understand how structures support loads;
5. To develop an organized approach to problem-solving. You will be introduced to a general strategy for problem-solving which will be applied to problems throughout the course.

Problem Labs:

The "discussion groups" (DGD) listed in the timetable for this course are problem-solving tutorials, and will be run by the teaching assistants. In each tutorial you will work through problems on the material currently being covered in class. Many tutorials will include a quiz (15 - 20 minutes) on material from recent classes. **No advance notice will be given of these quizzes**. **Attendance at tutorial sessions is compulsory.**

You have already been assigned to a tutorial section, denoted by a section number on your timetable (e.g. DGD 1). Because of limits on the capacities of the rooms and the need to keep the work load of the teaching assistants balanced, it will not be possible to change sections.

You will also be assigned a number of problems to work on every week, these problems will be handed in to be marked. These problems represent the minimum amount of work that you should be doing for this course, and **it is strongly recommended that you solve additional problems to gain practice**. Short answers for many problems are given at the back of the textbook (although beware that some of them are wrong!).

Midterm Examination:

There will be one mid-term exam, to be held in class during the week of October 19th to the 23rd. At least one week's notice will be given as to the exact date and time.

Marking Scheme:

Midterm Exam	30%
Assignments & Quizzes	15%
Final Exam	55%
Total Term	100%

Consultation:

The course professor and the teaching assistants will be available for individual consultation by email appointments. Their info will be available on the course website.

ACADEMIC REGULATIONS

The academic calendar regulations for Engineering are posted online at http://web5.uottawa.ca/admingov/regulations.html. Note in particular the following:

Attendance: Attendance at lectures and tutorials is mandatory. According to the regulations in the academic calendar, you may not be admitted to the examination if you have not attended 80% of classes.

Course requirements: You must fulfill all course requirements - quizzes and assignments in the problem tutorials, midterm examination, and final examination - to receive a grade in the course. If you do not, you may receive a mark of INC (incomplete).

Academic Fraud/Plagiarism: All work submitted for grading in this course is expected to be yours alone. Anything else constitutes plagiarism. Please review the regulations on academic fraud posted at: http://www.uottawa.ca/administration-and-governance/academic-regulation-14-other-important-information. Note that as an engineering student you are enrolled in a program which leads to licensing as a professional engineer, a status which demands a very high standard of ethical conduct.