**Syllabus of Theoretical Mechanics I (Statics)**

**SWJTU- Leeds Summer Semester 2017**

**1: Instructor**

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**2: Textbooks**

Hibbeler, R. C., *Engineering Mechanics, Statics*, (12th Ed.)

**3: Prerequisites**

Physics and Advanced Mathematics

**4: Course Description**

This 2-week intensive course includs **10 Lectures, 10 After-Class-Discussion and 2 Exam Sessions**.

It emphasizes the proper utilization of vector algebra and free-body diagrams to solve problems in the first course of the engineering mechanics sequence. The course begins with basic theory of engineering mechanics, using calculus, involving the motion of particles, rigid bodies, and systems of particles. The course covers six major areas of study: (1) vector algebra of forces and moments; (2) free-body diagrams and equilibrium of particles and rigid bodies, (3) structural analysis of internal and external forces of trusses, frames, and machines; (4) principles and application of friction; (5) centroids and centers of gravity; and (6) moments of inertia.

**5: Student Learning Outcomes**

When you complete this class you should be able to:

1. Define and calculate magnitude and direction of forces and moments.

2. Represent and calculate the reduction and simplification of force and moment systems.

3. Draw free-body diagrams for two- and three-dimensional force systems.

4. Calculate forces and moments acting internally or externally on an object.

5. Determine the location of the centroid and the center of mass for a system of discrete particles and objects of arbitrary shape.

6. Calculate moments of inertia for lines, areas, and volumes.

7. Solve simple statics engineering problems using Newton’s laws.

8. Recognize current social, economic, and environmental issues where statics principles are important for the development of engineering solutions.

**6: Course structure and communication**

The instructor recognizes the importance of effective communication in all disciplines and careers. We will be using both in-class and email to communicate during this course. You are responsible for any information conveyed to your at your listed preferred email address. In addition, email will be used for pre-class assignments and discussion of course materials.

***6.1: Calculator policy***

The use of a calculator is required and allowed on all exams and quizzes. Computers, tablets, smart phones, I-pads and similar electronics are not allowed on quizzes and tests.

***6.2: Professionalism***

One of the goals of this course is to teach students about professionalism, including the standards and expected behavior of your chosen profession. With this in mind, students are expected to demonstrate a behavior consistent with the conduct of an individual practicing in the engineering profession. Students are expected to: (1) come prepared for class; (2) respect faculty and peers; (3) demonstrate responsibility and accountability for your own actions; (4) sensitivity and appreciation for diverse cultures, backgrounds, and life experiences; (5) offer and accepts constructive criticism in a productive manner; (6) demonstrate an attitude that fosters professional behavior among peers and faculty; (7) be punctual to class meetings; (8) maintain a good work ethic and integrity; and (9) recognize the classroom as a professional workplace.

**7: Graded Material**

***7.1: Class Attendance, After-Class-Discussion, Timeliness***

You are expected to meet every class meeting on time and prepared. Attendance will be taken. Should you find it necessary to miss a class for any reason, you are expected to notify your instructor as early as the absence is known preferably before the absence. The purpose of the after-class-discussion is to help you finish the home work and inform your TA/instructor about any open questions. It’s important that you particpate the after-class-discussion provide feedback to your TA/instructor.

Any late work will be assessed a 15% deduction for each 24 hour period that it is late. Late assignments after 24 hours will not be accepted. Unless otherwise specified, assignments are due at the beginning of the class period on the date due.

***7.2: Readings Assignments***

You are expected to complete your assignments before class. Most lessons you will have pre-class assignments to ensure you have completed the reading assignments. Success in the classroom will require that students prepare extensively before attending each lecture. Failure to prepare before class will severely hurt the student’s performance. The course requires several reading assignments and students should complete the pre-class assignments.

***7.3: Homework***

Homework assignments are shown on the course schedule. The assignments will be collected at the beginning of the class on the next lecture. If the assignment is not handed in prior to the lecture commencing it will be considered late, no exceptions! Only one of the submitted problems will be graded and student will not know ahead of time which problem this may be. Not all of the problems will be from the text and some problems will also be intentionally modified from the text problems.

To take into consideration certain inconveniences, your two (2) lowest homework scores will be dropped. Each graded homework problem will be worth 10 pts. Two points will be lost with an incorrect answer, 3 for sloppy work or incorrect format, 2 for incorrect or undecipherable free body diagram (FBD), and 3 pts for the incorrect method or approach to the solution. Homework format is available and failure to adhere to it will result in an unaccepted assignment. You should only solve one problem per page of A4 paper. You may extend that problem into another page but then should begin the next problem on a new page if you require more room. If more than one page is needed for a solution you should number each page and the first page should be marked with a “continued on next page” note on the bottom. Homework solutions that appear to be the same or copied from a peer will not be graded. You can work with classmates if you have questions or problems, but you are responsible for your own work!

Homework for statics must be turned in with the following format:

1. On A4 paper and done in pencil, no ink.

2. No cross outs, use an eraser.

3. Homework set number, name, date, course name, and page number(s) on the top of the page.

4. Begin problem with the number of the problem and the problem statement. Do not cut and paste the problem statement.

5. **Knowns/unknowns** – list the given parameters and the parameters you must find.

6. **Free-body diagrams (FBD)** – Draw a neat FBD that includes arrows with arrowheads, necessary dimensions, and parameters needed to solve the problem

7. **Solution** – provide all the details so that anybody can easily follow your solutions and problem-solving approach. All intermediate values identified with the variable name (i.e., F1=50) should be underlined with units.

8. **Answer** – the final answer at the end of the problem should be identified with the

variable name, include units, and inside a box. Include an arrow (from the far right side of the page) pointing to each final answer. Each final answer should have a double underline.

9. Each section of the problem should be separated by a straight line. At the conclusion of each problem solution, include a double straight line to separate each problem.

Disorganized, incomplete, or copied work will be penalized. Homework not submitted in the above format will not be graded. Please refer to the homework format example for detailed homework guidelines.

***7.4: Quizzes***

There will be in-class quizzes. The quizzes will be unannounced and unscheduled. These quizzes will measure your speed and accuracy as you progress. The quizzes will be given at the start of each class session. The quiz will be limited to 10 or 15 minutes and you are required to show all work. Be sure to bring paper, pencil, calculator, and text to class. Quiz solutions not handed it promptly when requested will not be graded. Quizzes shall be graded similar to homework and are worth 10 points. Quizzes are closed notes and homework.

***7.5: Exams***

There will be one mid and one final exam. The mid-exam will be conducted two days after Class#5 at the time and location TBA. See course outline for specific dates and arrange your schedule to avoid conflicts with these times as this is the only time exams will be offered. You will be allowed **2 hours** to complete the tests, which will be administered according to the schedule. The final exam will be given at the time and location TBA. The exams will be of varying format including multiple choice, complete answer problems requiring evidence of worked out problems, and some will require only the selection of the correct answer. All exams will be closed book, closed notes, and closed homework. You will be allowed to bring a single A4, hand-written, one-sided, sheet of paper with formulas or written notes(Cheat Paper). Copies of other student’s work will not be acceptable! The breakdown of the percentage and grading for the exams is listed in this syllabus.

***7.6: Grades: Weighting and Letter Grades***

The following weighting system will be used in determining final grade for the course

Item Percent

Class attendance (2 free passes) 5%

Homework 15%

Quizz 10%

Mid-Exam 35%

Final Exam 35%

Total 100%

The instructor will determine the final grades for the course using his professional judgment.

**8: Academic Integrity**

SWJTU-Leeds expects its students to maintain complete honesty and integrity in their academic pursuits. The integrity of the classes offered by any academic institution solidifies the foundation of its mission and cannot be sacrificed to expediency, ignorance, or blatant fraud. Therefore, I will enforce rigorous standards of academic integrity in all aspects and assignments of this course. Students are responsible for understanding the Academic Honor Code, which is contained in the Student Handbook.

**9: Classroom Conduct**

Since you are all professionals in training, you are expected to conduct yourself in a professional manner while in this class. For instance, while the class is in progress, everyone is expected to put away any distractors (i.e., cell phones) and ***refrain from eating and drinking***. You are expected to dress properlyy. Please do not force the instructor to remind you that you should behave in a professional manner.

**10:Course Outline**

The outline below provides a general overview of the course. One 2 hours after-class-discussion will be scheduled following each class and TA will be there to help homweork.

Detailed reading and homework assignments along with updates to this schedule will be provided in class.

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| Lecture# | Topics | Reading Assignment |
| 1 | Review of syllabus, General principles, scalars and vectors  Force vectors, Cartesian vectors  Position vectors, Dot product | 2.1-2.5  2.6-2.9  3.1-3.4 |
| 2 | Equilibrium of particles, Free-body diagrams | 4.1-4.2 |
| 3 | Moments (scalar formulation), Cross product  Moments (vector formulation), Principle of moments,  Moment about an axis, Moment couples, equivalent force systems | 4.3-4.5  4.6-4.7  4.8-4.9 |
| 4 | Simplification of forces, Distributed loading  Equilibrium of rigid bodies | 5.1-5.3  5.4-5.5 |
| 5 | 2D equilibrium and 2D force members, 3D equilibrium  Equilibrium in three-dimensions, 3D equilibrium and rigid body constraints | 5.5-5.7  6.1-6.4 |
|  | Mid-Exam(Chapters 1.1 to 6.4) |  |
| 6 | Trusses – method of joints and method of sections | 6.5-6.6 |
| 7 | Space trusses, Frames and machines  Frames and Machines | 6.6  7.1-7.4 |
| 8 | Shear and Moment: Equations and diagrams | 7.1-7.4,8.1-8.8 |
| 9 | Friction  Center of Gravity, Centroids | 9.1-9.4  9.5-10.4 |
| 10 | Fluid Pressure, Moment of Inertia  Moment of Inertia, Review for Final Exam | 10.5-10.8 |
|  | FINAL EXAM (Chapters 6.5-10.8) |  |

* Homework will be collected at the beginning of the class on the next lecture.