

ME 2010 and ME 2011 - Dynamics & Statics

Fall 2016
Dillard 202

Time (MWF)	Instructor	Contact Information
ME 2010-001: 9:05-11:00	Dr. M.K. Orr , Assistant Professor, Engineering and Science Education & Mechanical Engineering	227 Fluor Daniel Bldg., 656-4317 marisak@clemson.edu
ME 2010-002: 11:15-1:10	Dr. J.I. Rodriguez , Lecturer, Mechanical Engineering	263 Fluor Daniel Bldg. jorger@clemson.edu
ME 2010-003: 1:25-3:20	Dr. P.F. Joseph , Professor of Mechanical Engineering	235 Fluor Daniel Bldg., 656-0545 jpaul@clemson.edu

Text: Biggers 5th edition (Orange cover, spiral bound, 4th ed. not allowed), HW problems and extra examples from Bedford & Fowler (on-line) Statics and Dynamics, 5th ed. You should bring the Biggers text and the Learning Exercise pages (for the chapter to be covered), your calculator, and your i>clicker to every class.

Course Objectives: This course is designed to provide students with the opportunity to

1. learn the basic principles of equilibrium of static rigid bodies and systems, and the kinematics and kinetics of dynamic rigid bodies and systems,
2. develop the ability to formulate and solve problems in a simple and logical manner using free-body, kinetic, and kinematic diagrams based on vector or scalar methods as appropriate, and
3. work individually and in teams to communicate thought processes in a clear and understandable manner through use of sketching, consistent mathematical notation, orderly display of solutions, and written descriptions when helpful.

Student Learning Outcomes: Students who are successful in this course will demonstrate:

1. an understanding of the fundamental principles of statics and dynamics by properly selecting and applying governing equations in problem solving,
2. the ability to interpret, simplify, and model given engineering problem situations,
3. the ability to develop governing equations of statics and dynamics of rigid bodies for specific situations, applying proper boundary and loading conditions,
4. the ability to use analytical and numerical methods to arrive at solutions to the governing equations, and
5. the ability to work as individuals and as members of a small team to conduct engineering analysis and to communicate the results in a professional manner.

Prerequisites: You must have completed PHY 1220, MATH 1060 and 1080, and ENGR 1070/1080 with a C or better. You must have completed or be co-enrolled in PHYS 1240, ENGR (1410 or 1090), ENGR (or EG) 2080, and MATH 2060, ME 2010 is a prerequisite for ME 2040 (Mechanics of Materials), and ME 3080 (Fluid Mechanics), and several technical electives. ME students must earn a C or better in ME 2010 to proceed to the above courses. The knowledge you gain here will be required in essentially all of your coming ME courses. You must succeed in ME 2010 within three attempts (a W counts as an attempt) to remain in the ME program.

In terms of topics that are prerequisite for this course, you are expected to be competent in the following: geometry, trigonometry, solving systems of linear algebraic equations, systems of units, computational accuracy, integration, differentiation, sketching to communicate. If you have weakness in any of these areas, seek outside help to eliminate the weakness before it becomes an impediment to your learning in this course. These topics will not be reviewed in this course.

Attendance: You are expected to attend every class except due to illness or official required University business. Interviews for CO-OP positions, visits to job fairs, etc. are optional and not required. So do not expect to be excused from class for such activities; rather simply schedule them at other times. If you must miss a class, see a fellow student and bring yourself up to speed. Although there is no “credit” purely for attendance, there will be in-class work, including group work and individual quizzes that will all contribute to your grade. Therefore, absences will be obvious and your group members will be at a disadvantage when doing group work without you. If you miss a class for any reason, there is no opportunity to make-up that missed in-class work. Students are expected to wait 15 minutes in the event the instructor is late to class.

Any exam that was scheduled at the time of a class cancellation due to inclement weather will be given at the next class meeting unless contacted by the instructor. Any assignments due at the time of a class cancellation due to inclement weather will be due at the next class meeting unless contacted by the instructor. Any extension or postponement of assignments or exams must be granted by the instructor via email or Blackboard within 24 hours of the weather related cancellation.

In-class Decorum: You are encouraged to discuss statics and dynamics during in-class work times, but you are expected to pay quiet attention when your instructor is speaking. When you carry on a conversation, you are disturbing and detracting others from their potential for success. When your instructor is speaking, working on the white board, or demonstrating a concept, those sitting at tables with their back to instructor should turn to face the instructor. No tobacco products of any kind are acceptable in the class room. You may bring a drink or snack if you clean up afterward. If you are too sleepy to stay awake in class, you should remain at home in bed where you can sleep comfortably.

Technology: You **must bring your i>clicker and extra batteries to each class**. Please write your name on your clicker where it is easy to see. Without your clicker or with dead batteries, you will not be able to answer the in-class questions and there is no make up for clicker quizzes. Answers on paper will not be accepted if you forget your clicker or bring your roommate’s by mistake. You will need your calculator in most classes, so be sure you have it. You will need to bring your laptop **ONLY** on the last day of class for the course evaluation. **Use of laptops during class is strictly prohibited unless specifically requested by your instructor. No cell phone, Smart-Watch, Google-Glass, or any wireless device is allowed to be turned on in any class, including during tests. Such devices used in class may be collected or you may be asked to leave the class at the option of the instructor.**

Academic Integrity: The University policy states: “As members of the Clemson University community, we have inherited Thomas Green Clemson’s vision of this institution as a “high seminary of learning.” Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form.”

“When, in the opinion of a faculty member, there is evidence that a student has committed an act of academic dishonesty, the faculty member shall make a formal written charge of academic dishonesty, including a description of the misconduct, to the Associate Dean for Curriculum in the Office of Undergraduate Studies. At the same time, the faculty member may, but is not required to, inform each involved student privately of the nature of the alleged charge.”

You may, and are encouraged to, work in study groups to do homework but you do not copy someone else’s work. Furthermore, do not use a completed Learning Exercise worksheet in class as this is self-defeating and unfair to the students at your table. Copying on tests or quizzes will result in immediate failure of the course and prosecution as required by the University. Failing grades due to cheating remain on your record and are not subject to the Forgiveness policy. It will be obvious to potential employers why the F-grade has not been removed from your transcript. Two convictions of cheating results in expulsion from the University. In-class group work is an obvious exception where discussion and cooperative work is **expected and desired**.

Title IX: Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran's status, genetic information or protected activity in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972. This policy is located at <http://www.clemson.edu/campus-life/campus-services/access/title-ix/>. Mr. Jerry Knighton is the Clemson University Title IX Coordinator. He also is the Director of Access and Equity. His office is located at 110 Holtzendorff Hall, 864.656.3184 (voice) or 864.656.0899 (TDD).

Peer Assisted Learning (PAL): We are fortunate to be able to have peer leaders (formerly known as SI or supplemental instruction leaders) working inside and outside the class periods to help you maximize your learning. Your peer leaders are students who have proved themselves in the subjects of Statics and Dynamics and are excellent students overall. You must show them the same respect you show to faculty instructors. They are here to help you in class and in optional evening sessions. You should think of your instructor and the peer leaders as a team working with you to enable your success. However, you are the team member being evaluated.

Office Hours: Your instructor will tell you their office hour policy. Feel free to ask help from any of the instructors.

Important Dates:	8/23/16	Last day to add a class
	8/30/16	Last day to drop a class without receiving a W
	10/21/16	Last day to withdraw from a class without a final grade

E-mail: E-mail may be used to deliver important or urgent information throughout the semester. You are responsible for checking your email for such information. Forwarding to Hotmail, yahoo, or other accounts that get overloaded may cause you to miss important information.

BlackBoard (BB): The ME 2010 BB web page will be used to post HW and reading assignments, HW solutions, updates to our class schedule, etc for all sections. Sample tests and test solutions will also be found there. You are responsible for checking your BB page for such information. Grades will be posted in your section's ME 2011 BB page.

Reading: There will be a reading assignment to be completed prior to attending each class. On some days, the lectures will be quite short and will only highlight the material you have read and clear up possible questions on the material. This will allow time for more in-class activities in which your learning can be guided in real-time. Therefore, **careful, critical, and timely reading of your book is essential to your success.** Make notes and questions in your book when something is not clear. Follow up with these either in class or out of class. The book provides a number of questions in red font you should attempt to answer as you read.

Optional Reading and Example Problem Sources: Although the textbook has all the required reading content, if you want an alternative wording and presentation, you have access to this in your online Pearson website. Log on using the access code you received with your textbook. Click on "Student Study Pack". Then mouse over the chapter numbers to find the one you want (the chapter numbers are very different from the Biggers text) and click on it. Then click on the "Review questions" for the selected chapters to find alternative textual material along with some questions to test your reading comprehension. The answers are also available. Be aware, the language and symbols will be different, as they are in any two textbooks. You will have to do your own interpretation of the new terminology. If you want additional example problems, click on the "Problems Bank with Extra Solutions" button for the selected chapter. In addition, the University library has nearly every text book ever written on statics and dynamics and this resource is available to anyone searching for an additional source of example problems and/or alternative presentation of certain material.

Homework: There is very strong correlation between good HW solutions and success on the tests and the course. HW problems will be assigned nearly every class and ideally they should be completed before the next class, if not completed then at least attempted with an honest attempt. Participation in the PAL sessions is a great way to keep this pace, noting that falling behind is difficult to recover from. The HW problems, which are merely representative of the material, will be taken primarily from the Bedford and Fowler text books. These problems are available on your online site and in a few cases are also posted on BB with additional questions. Some students like to copy and paste the HW wording and art on their solutions, which sets the stage for well-organized HW solutions. Solutions to all assigned problems will be placed on your BB web page. One of the keys to success in this course is how you make use of existing solutions. Do not confuse memorization with understanding. Needless to say, if you choose to copy someone else's work or just glance over the provided solutions you will not learn the material. At each test, you will bring your collected papers for your instructor to examine. Two percent (2%) of your final grade will be allotted to your HW although no papers will be graded and corrected for accuracy. HW is a very big part of your learning process. No student can perform close to their potential in the course without a concerted effort on the HW.

In-Class Questions: Short answer questions will be given in most classes through the semester. These will be either at the start of class, the end of class, or during class. They will be given to ensure that you are doing the required reading prior to class and are paying full attention to the material being discussed in class. These questions will be primarily individual efforts, but in some cases you will be asked to answer after group or table discussion. You will enter answers to parts of these activities using your i>clicker. Combined with the learning exercise participation, they will account for 13% of your total grade.

Learning Exercises: You will purchase the work pack of exercises at the "Campus Copy Shop" in Rubin Square downtown. These are primarily problem solving activities, most of which will be done in class. They are an important step in your learning process. They follow reading and listening in class and they precede doing the HW. Some of these are identified in your text as bold italic red type though the numbers may be different. These will be team activities, but each of you may be asked to enter answers to selected parts of these activities using your i>clicker. Actively seeking help from your team members and providing help to them is what peer learning is all about. You are advised to be an active participant in the in-class activities since they contribute to your grade as reflected in your clicker scores.

Tests: There will be three common tests given on Wednesday evenings from 7:00 – 9:00 as listed on the University common testing web page and on dates listed on your schedule. Anyone approved for extra time must start early or take the test during the day monitored by ASC. The test replaces class on that Wednesday unless you are informed differently. Clarity and completeness of your work including sketches, formulation, notation, definitions, and solution process will be required for full credit. If your work is not clearly communicated, points will be lost even for a correct answer. Any tests missed for other than a documented illness or family emergency or for official required (not optional) University business will be recorded with a zero grade. No other course can excuse you from any requirements of this class for any reason (field trip, concert, practice, etc.). A re-weighting of the test/exam scores will be recorded only in the exceptional cases mentioned above. Any instance of cheating on a test will result in failure of the course and a formal charge of academic dishonor will be pursued. Each test will contribute 19% to your total grade.

Final Exam: There will be a comprehensive final exam. No exemptions will be given. The final will contribute 28% to your total grade. The final exam is not a common exam. The 3 finals are given at times following:

Section 001 (Dr. Orr)	Tuesday, December 6	3:00 – 5:30 PM
Section 002 (Dr. Rodriguez)	Tuesday, December 6	8:00 – 10:30 AM
Section 003 (Dr. Joseph)	Thursday, December 8	3:00 – 5:30 PM

Note: The above are times available because of your "lab" time for this course, **so they will not appear as the assigned time IF you look at the standard course time assignments.** So, do not MISS your actual final exam!

Assessing Critical Thinking Abilities Pre and Post ME 2010 Class: You will be asked to take an online test at the beginning and end of the course called the California Critical Thinking Test, this test will assess your strengths in a number of areas of critical thinking. **These exams help Clemson University and your instructors improve teaching methods to improve the quality of our student progress.** Your scores have no impact on your grade, your standing at Clemson, or anything else. However, completion of both the pre and posttest is required for the grading adjustment explained below. These exams typically take 45-50 minutes, and do not involve any studying, preparing, or outside work.

Grading: Course grades will be assigned as follows: A=90-100, B=80-89, C=70-79, D=60-69, F=0-59. No curving will be done based on class average. However, if you have taken all the tests, have been diligent in doing HW (>80% credit), have good attendance (>80% as determined by i>clicker responses), and completed both the pre and post CCTST test, the lowest one of your test grades will be reduced to 9% and your final exam will be increased to 38%, if this is to your advantage. No make-up tests will be given. If you miss a test for an excusable reason, as described above, the other tests will count 28% each and the final will count 29%. In-class grades will be adjusted to remove days missed due to documented illness. There will be no “extra credit” work. In summary,

<i>Activity</i>	<i>Grade</i>
Homework	2
In-class questions	13
Test 1	19
Test 2	19
Test 3	19
Final Test	28
<i>Total</i>	<i>100</i>

Equation Sheet for Tests: An equation sheet for each test will be provided with the test. This includes the final exam. This sheet will be made available well before each test so students can become familiar with it. Students will not be able to use their own equation sheet during a test.

Accessibility Accommodations: Clemson University values the diversity of our student body as a strength and a critical component of our dynamic community. Students with disabilities or temporary injuries/conditions may require accommodations due to barriers in the structure of facilities, course design, technology used for curricular purposes, or other campus resources. Students who experience a barrier to full access to this class should let the professor know, and make an appointment to meet with a staff member in Student Accessibility Services as soon as possible. You can make an appointment by calling 864-656-6848, by emailing studentaccess@lists.clemson.edu, or by visiting Suite 239 in the Academic Success Center building. Students who receive Academic Access Letters are strongly encouraged to request, obtain and present these to their professors as early in the semester as possible so that accommodations can be made in a timely manner. It is the student’s responsibility to follow this process each semester. You can access further information here: <http://www.clemson.edu/campus-life/campus-services/sds/>.

8/16/2016				Reading	Homework	
CL#	Date		ME 2010 Fall 2016	Biggers Text	B&F Text	HW #
1	17-Aug	W	Course Policy, etc., Intro: Motivation, Approach, Modeling Intro: Vectors: meaning and notation, Units, Accuracy CCTST	Syllabus Schedule I-1 -- I-10	prepare for quiz on course policy (syllabus)	
2	19-Aug	F	Governing Eqns, Gravity, FBDs & KDs, Translation	1-1 -- 1.4	Complete the FBD exercises started in class for HW #1	1
3	22-Aug	M	Straight Line Translation: Example - Dynamics of Lifting and Lowering	1-1 -- 1.4	3.11+, 3.14+, 3.17+, 3.53+, 3.58+	2
4	24-Aug	W	Size & Shape, Moment, Couple, Wheel & Wrench in Equilibrium	1-5 -- 1-9	5.6+, 5.17+, 5.27+, 18.5+, 18.6+	3
5	26-Aug	F	Friction, Translation of Body w/size & shape, Parametric Formulation	1-5 -- 1-9	9.10, 9.11, 9.13, 9.35, 9.43 + extras	4
6	29-Aug	M	Kinematics of Straight Line Translation, "svat" relations & examples	2-1 -- 2-5	13.24, 13.28, 13.59, 14.9, 14.13, 14.30	5
7	31-Aug	W	Kinematics of Curved Path Translation, Rectangular Coords Normal-Tangential Coords	3-1 -- 3-3	13.81, 13.93, 13.106, 13.115, 13.126, 13.133+	6
8	2-Sep	F	Polar Coords, Chain Rule, Kinetics of Curved Path Translation, Relation between n-t & r- θ	3-4 -- 3-6	13.140, 13.153, 13.154, 13.157, 13.158 + extra for 158	7
9	5-Sep	M	Center of Gravity -- Integration, Finite Shapes, Complex Shapes	4-1 -- 4-4	7.4, 7.18, 7.28, 7.62, 7.104, 7.134	8
10	7-Sep	W	Mass Moment of Inertia, Parallel Axis Thm -- Integr & Finite Shapes	4-5 -- 4-7	8.106 & 8.107 using integration 8.110 & 8.111 & 8.132 using finite shapes	9
11	9-Sep	F	Area Moment of Inertia, Parallel Axis Theorem, Review	4-8 -- 4-11	8.9, 8.10, 8.25 using integration 8.47, 8.81 using finite shapes	10
12	12-Sep	M	Review	1.1 -- 4.11		
13	14-Sep	W	Test 1 (7:00-9:00)	1.1 -- 4.11		
14	16-Sep	F	Static Equilibrium in 2-D and 3-D, Forces as Vectors in 3-D	5-1 -- 5-2	2.84, 2.85, 2.92	11
15	19-Sep	M	Forces, Moments, Couples as Vectors in 3-D Systems of Forces, Moments, Couples	5-3 5-4	4.61, 4.69, 4.120 4.121, 4.161, 4.1.63, 4.197	12
16	21-Sep	W	Supports & Reactions, Stability, Statical Determinacy & Indeterminacy	5-5 -- 5-6	5.48, 5.50, 5.51, 5.82, 5.106, 5.108	13
17	23-Sep	F	Trusses - Method of Joints, Method of Sections, Design Issues	5-7	6.12, 6.21 (use method of joints), 6.46, 6.55, 6.56 (use method of sections)	14
18	26-Sep	M	Static Beams, Reactions, Shear and Moment Eqns and Diagrams	5-8	10.41, 10.42, 10.43, 10.44	15
19	28-Sep	W	Static Beams V&M diagrams, Relationships between load, V, M	5-8	10.47, 10.48, others TBD (use relationships)	16
20	30-Sep	F	Columns, Shafts, 3-D members	5-8	Complete the Fireworks sign problem if you did not finish it in class, 3-D problem on BB	17
21	3-Oct	M	Static Frames & Machines	5-9	6.77, 6.82, 6.88(also draw V&M&axial force diags for ABCD), 6.102, 6.113	18

22	5-Oct	W	Static Frames & Machines	5-9 -- 5-10	9.136, 9.137	19
23	7-Oct	F	Friction	5-11 -- 5-13	9.70, 9.128, 9.131, 9.132	20
24	10-Oct	M	Constrained Translation of Separate Bodies, Relative Translation	6-1 -- 6-2 6-3 -- 6.4	3 probs from Meriam (see BB HW probs Folder) plus B&F 13.163, 13.165, 13.166	21
25	12-Oct	W	Kinematics of Rigid Body in 2-D General Motion	7-1 -- 7-5	17.4, 17.11, 17.87	22
26	14-Oct	F	Kinematics of Rigid Body in 2-D General Motion, Review	7-1 -- 7.5	17.41, 17.106	23
27	17-Oct	M	Kinetics, General 2-D Rigid Body Motion	8-1, 8-2	18.27, 18.46, 18.113	24
28	19-Oct	W	Test 2 (7:00-9:00)	5-1 -- 7-5		
29	21-Oct	F	Rotation about Fixed Axis -- a Special Case Systems of Bodies	8-3	18.8, 18.21, 18.22, 18.119	25
30	24-Oct	M	General Motion -- Systems of Bodies	8-1 -- 8-3	18.49, 18.52, 18.59	26
31	26-Oct	W	Rolling without Slip, Friction, Rolling with Slip, Rolling Resistance	8-4 -- 8-6	18.38, 18.121	27
32	28-Oct	F	Work-Energy in Translation, Rotation, General Motion	9-1 -- 9-7	15.4, 15.18, 15.57	28
33	31-Oct	M	Energy Methods : Systems of Masses in General Motion	9-5 -- 9-7	19.14, 19.25, 19.27, 19.36	29
34	2-Nov	W	Energy Methods : Conservation Principles Power and Efficiency	9-8 -- 9-10 9-11 -- 9-12	19.14 (rework using conservation of energy), 19.40, 19.43 (use either energy method)	30
35	4-Nov	F	Linear & Angular Impulse Momentum, Systems & Conservation	10-1 -- 10-5	16.10, 16.14, 16.52, 19.50, 19.52	31
	7-Nov	M	Fall Break			
36	9-Nov	W	Angular Impulse Momentum, General Motion, Systems & Conserv	10-5 -- 10-6	19.57, 19.61	32
37	11-Nov	F	Systems & Conservation of Momentum, Types of Impact	10-6 -- 10.7	19.65, 19.66	33
38	14-Nov	M	Review			
39	16-Nov	W	Test 3 (7:00-9:00)			
40	18-Nov	F	Coefficient of Restitution, Mechanical Energy Loss	10-7	16.129	34
41	21-Nov	M	Eccentric Impact	10-7	19.67, 19.72	35
	23-Nov	W	Thanksgiving			
	25-Nov	F	Thanksgiving			
42	28-Nov	M	Rotating Coordinates	11-1 -- 11-6	Define Local and Global coord systems for rest of problems on pages 1-3 of LEX 11, 17.121, 17.122, 17.130, 17.131, Probs 11.1, 11.2 in LEX #11	36
43	30-Nov	W	Review			
44	2-Dec	F	Review for final exam, Course Evaluation, CCTST	11-1 -- 11.6		

	6-Dec	Tu	FINAL EXAM Section 001 -- 3:00-5:30 (Dr. Orr)	I-1 -- 11.6		
	6-Dec	Tu	FINAL EXAM Section 002 -- 8:00-10:30 (Dr. Rodriguez)	I-1 -- 11.6		
	8-Dec	Th	FINAL EXAM Section 003 -- 3:00-5:30 (Dr. Joseph)	I-1 -- 11.6		