

# The University of Alabama

## Department of Aerospace Engineering and Mechanics

### AEM 264 – Dynamics

Fall 2012

Text: Engineering Mechanics Dynamics, 13<sup>th</sup> Edition, Pearson Prentice Hall, R. C. Hibbeler

| Class | Day | Date    | Topics  | Text Material |
|-------|-----|---------|---|---------------|
| 1     | W   | 8/22    | Class Introduction, Kinematics of Particles, Mastering Engineering                                | 12.1-2        |
| 2     | F   | 8/24    | Kinematics of Particles, Rectilinear Kinematics   | 12.1-2        |
| 3     | M   | 8/27    | Rectilinear Kinematics, Erratic Motion  | 12.3          |
| 4     | W   | 8/29*   | General Curvilinear Motion, Rectangular Components  | 12.4-5        |
| 5     | F   | 8/31    | Projectile Motion   | 12.6          |
|       | M   | 9/3     | <b>HOLIDAY – LABOR DAY</b>  |               |
| 6     | W   | 9/5     | Normal & Tangential (n-t) Components  | 12.7          |
| 7     | F   | 9/7     | Absolute Dependent Motion   | 12.9          |
| 8     | M   | 9/10    | Relative Motion   | 12.10         |
| 9     | W   | 9/12    | Absolute Dependent and Relative Motion  | 12.9-10       |
| 10    | F   | 9/14    | Kinetics of Particles, Newton's 2 <sup>nd</sup> Law, Equations of Motion, Rectangular Coordinates | 13.1-4        |
| 11    | M   | 9/17    | Newton's 2 <sup>nd</sup> Law, Rectangular Coordinates   | 13.1-4        |
|       | T   | 9/18    | <b>Exam #1 – Chapter 12</b>   |               |
| 12    | W   | 9/19    | Equations of Motion, Normal & Tangential (n-t) Coordinates  | 13.5          |
| 13    | F   | 9/21    | Equations of Motion, Normal & Tangential (n-t) Coordinates  | 13.5          |
| 14    | M   | 9/24    | Kinetics of Particles, Work & Energy  | 14.1-3        |
| 15    | W   | 9/26    | Work & Energy   | 14.1-3        |
| 16    | F   | 9/28    | Power & Efficiency  | 14.4          |
| 17    | M   | 10/1    | Conservation of Energy  | 14.5-6        |
| 18    | W   | 10/3    | Conservation of Energy  | 14.5-6        |
|       | R   | 10/4    | <b>Mid-Semester Break</b>   |               |
|       | F   | 10/5    |   |               |
| 19    | M   | 10/8    | Linear Impulse & Momentum   | 15.1-2        |
| 20    | W   | 10/10** | Conservation of Linear Momentum   | 15.3          |
| 21    | F   | 10/12   | Direct Impact   | 15.4          |
| 22    | M   | 10/15   | Oblique Impact  | 15.4          |
| 23    | W   | 10/17   | Kinematics of Rigid Bodies, Translation   | 16.1-2        |
| 24    | F   | 10/19   | Rotation about a Fixed Axis   | 16.3          |

|    |   |         |   |        |
|----|---|---------|---|--------|
| 25 | M | 10/22   | Absolute Motion   | 16.4   |
|    | T | 10/23   | <b>Exam #2 – Chapters 12-15</b>                               |        |
| 26 | W | 10/24   | Relative Motion, Velocity                                     | 16.5   |
| 27 | F | 10/26   | Relative Motion, Velocity                                     | 16.5   |
| 28 | M | 10/29   | Instantaneous Center  | 16.6   |
| 29 | W | 10/31+  | Instantaneous Center  | 16.6   |
| 30 | F | 11/2    | Relative Motion, Acceleration                                 | 16.7   |
| 31 | M | 11/5    | Relative Motion, Acceleration                                 | 16.7   |
| 32 | W | 11/7    | Relative Motion, Acceleration                                 | 16.7   |
| 33 | F | 11/9    | Kinetics of Rigid Bodies, MMOI                                | 17.1   |
| 34 | M | 11/12   | Equations of Motion, Translation, Rotation about a Fixed Axis | 17.2-4 |
|    | T | 11/13   | <b>Exam #3 – Chapters 12-16</b>                               |        |
| 35 | W | 11/14   | Equations of Motion, Rotation about a Fixed Axis              | 17.4   |
| 36 | F | 11/16   | Equations of Motion, General Plane Motion                     | 17.5   |
| 37 | M | 11/19   | Equations of Motion, General Plane Motion                     | 17.5   |
|    | W | 11/21   | <b>HOLIDAY – THANKSGIVING</b>                                 |        |
|    | R | 11/22   |   |        |
|    | F | 11/23   |   |        |
| 38 | M | 11/26   | Equations of Motion, General Plane Motion                     | 17.5   |
| 39 | W | 11/28   | Rigid Bodies, Work & Energy                                   | 18.1-4 |
| 40 | F | 11/30++ | Rigid Bodies, Work & Energy                                   | 18.1-4 |
| 41 | M | 12/3    | Conservation of Energy  | 18.5   |
| 42 | W | 12/5    | Conservation of Energy  | 18.5   |
| 43 | F | 12/7    | Conservation of Energy and Review                             | 18.5   |
|    | T | 12/11   | <b>Final Exam – 8:00 am</b>                                   |        |

\* Last day to drop a course without a grade of “W” 29 August

\*\* Midterm grade submissions for 100-200 level courses 10 October (due 12:00 Midnight)

+ Last day to drop a course with a grade of “W” 31 October

++ Last day for all tests, etc. 30 November

# AEM 264 – Dynamics Academic and Administrative Policies

**Instructor:** Dr. James Paul Hubner  
**Office:** 215 Hardaway Hall

**E-Mail:** [phubner@eng.ua.edu](mailto:phubner@eng.ua.edu)  
**Phone:** 348-1617

**Meeting Time:** MWF: 11:00 – 11:50, HC Comer 240  
**Office Hours:** TR: 9:00 – 11:00  
**Pre-requisites:** AEM 201, MATH 126 or MATH 146

**You are expected to be proficient through Statics and Calculus II, and able to sketch clearly. Proficiency in both geometry and trigonometry is expected.**

**Textbook:** *Engineering Mechanics Dynamics*, 13<sup>th</sup> Edition, Pearson Prentice Hall, author: R. C. Hibbeler.

**Mastering Engineering access code is required: AEM264002FALL2012HUBNER13ED**

**Course Objectives:** The main objective of this course in mechanics is to develop the ability to analyze engineering problems involving motion in a simple and logical manner and to obtain solutions through the application of the basic principles of mechanics. Topics include kinematics of particles and rigid bodies, Newton's laws of motion, and the principles of work-energy and impulse-momentum for particles and rigid bodies

|                    |   |     |
|--------------------|---|-----|
| <b>Activities:</b> | Three examinations [equation sheet(s) provided, no drops]     | 50% |
|                    | MasteringEngineering Homework (no drops)                      | 10% |
|                    | In-class Work (six drops)                                     | 15% |
|                    | Final Examination [comprehensive, equation sheet(s) provided] | 25% |

**There will be no make-up exams.** If you miss an exam for a documented valid reason, then your score on the final exam will be substituted for the missed exam score; otherwise, the missed exam will be scored as 0. Only one such substitution is permitted.

**Scale:**

|                           |    |
|---------------------------|----|
| 90% will earn at least an | A- |
| 80% will earn at least a  | B- |
| 70% will earn at least a  | C- |
| 60% will earn at least a  | D- |
| < 60% is failing          | F  |

**Exam Review:** Requests for the review of a graded exam problem **must be submitted in writing** (with the graded exam attached) **no later than the next class day following the return of the graded exam.** In this event, the entire exam, not just a single problem requested by the student, is subject to review. Upon review, the exam score may increase, remain the same, or decrease.

**Exam Do-over:** Each student who scores below 70 on a given exam **may** have the opportunity to re-work that examination and earn back **up to** 30% of the points that were missed on that examination. **To take advantage of the do-over opportunity all MasteringEngineering assignments related to the content of a given examination must have been completed.** The improved score following the do-over exam is capped at 70.

The re-worked examination will be due **no later than the start of the next class period following the return of the graded exam.** Absence from class on the day that the original graded exam is returned has no effect on the do-over due

date and time. **This examination re-work is still an exam and thus requires that there be no student collaboration.** This do-over policy does not apply to the Final Exam.

**Homework:** Homework will be assigned for each class period. It will consist of (a) lecture videos (linked via Blackboard Learn), (b) readings in the text and (c) tutorials and online problems in **MasteringEngineering**, the Pearson Prentice Hall online tutorial and homework system (<http://www.masteringengineering.com>). Course ID **AEM264002FALL2012HUBNER13ED**

**In-Class Work:** There will be one or more In-class Work assignments each class (except on the 3 exam days).

- **Write on one side of the page only.**
- Submitted work **must be legible and presented in a logical, easy-to-follow manner** or it will be graded as zero. Model solutions will be shown in the video lectures and in class.

**Attendance:** Attendance at all classes is expected. Classes will include in-class work to be graded.

**Collaboration:** Discussion and the exchange of ideas are important parts of the learning process, and I encourage such activities in a community of scholars. **However, you must ensure that any work you submit for grading is your own.**

**Professionalism:** All students in attendance at the University of Alabama are expected to be honorable and to observe standards of conduct appropriate to a community of scholars. The University expects from its students a higher standard of conduct than the minimum required to avoid discipline. Academic misconduct includes all acts of dishonesty in any academically related matter and any knowing or intentional help or attempt to help, or conspiracy to help, another student **except when explicitly permitted by the instructor**. The Academic Misconduct Disciplinary Policy will be followed in the event of academic misconduct.

Students are reminded that they are preparing for a profession (engineering) which has standards of ethics for professional behavior. These standards will be applied toward all class activities and assignments. The Code of Ethics for Engineers is maintained by the American Association of Engineering Societies. <http://www.aaes.org/CodesofEthics.asp>



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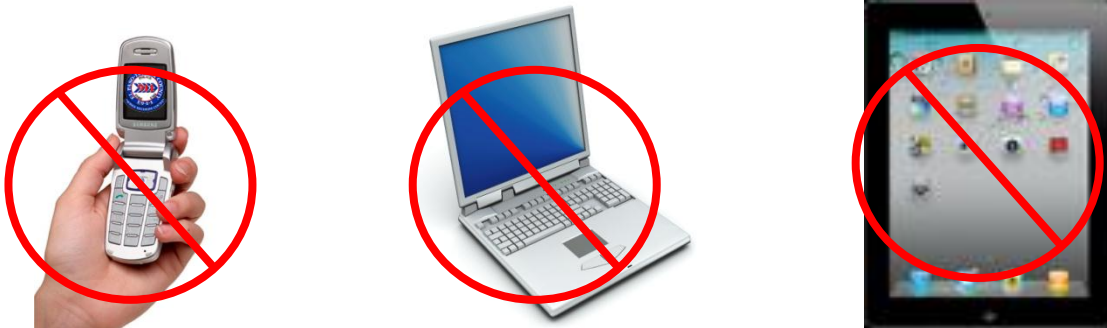
*As a member of  
the University of Alabama community,  
I will pursue knowledge;  
act with fairness, honesty, and respect;  
foster civic responsibility;  
and strive for excellence.*

THE UNIVERSITY OF  
**ALABAMA**  
FOUNDED 1831

**Services:** Students requiring disability services must follow the ODS (<http://ods.ua.edu>) guidelines. **Reserve ODS test rooms the first week of class.** University counseling services are available at <http://sa.ua.edu/counseling>.

**Electronic Communication:** Both Mastering Engineering, the Pearson Prentice Hall online tutorial and homework system (<http://www.masteringengineering.com>) and the University of Alabama Blackboard Learn (<http://ualearn.blackboard.com>) system will be used. Students are responsible for checking MasteringEngineering and Blackboard on a regular basis. Students are expected to check their **Crimson** email account regularly. Other e-mail systems will not be used.

**Wireless Devices:** Cell phones, pagers and other wireless devices must be set to silent mode or otherwise disabled before the start of class. **These devices must be left in your pocket, purse or book bag.** The use of laptops, tablets or similar devices in class is during lecture.



**Disclaimer:** Assignment sheets and course content are subject to modification when circumstances or sound pedagogy dictate and as the course progresses. If changes are made, you will be given due notice.