



## NORTH CAROLINA AGRICULTURAL AND TECHNICAL STATE UNIVERSITY

### Course Syllabus

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#### Course Information

*Course Number/Section* CAAE 331 – 01 (CAEE 231)  
*Course Title* Engineering Mechanics I (Statics)

*Term* Fall, 2013  
*Days & Times* 9:30 – 10:45 T, R

#### Professor Contact Information

*Professor* Dr. Taher Abu-Lebdeh, Ph.D., P.E.  
*Office Phone* (336) 285-3670  
*Email Address* taher@ncat.edu  
*Office Location* 437B  
*Office Hours* 1:00 – 2:00 M-F  
*Other Information* See blackboard for more information

#### Course Pre-requisites, Co-requisites, and/or Other Restrictions

Calculus I, Physics I

**Prerequisites by topic:** Linear Algebra, Calculus, Vectors, Analytic geometry, and basic concepts of physics.

#### Course Description

This course introduces the theory and application of engineering mechanics as it relates to statically determinant systems. Topics include basic forces, free body diagrams, vectors, resultants, equilibrium, pulley systems, rigid bodies, truss analysis, frame, pulleys, machine, internal forces in structural members, friction, center of gravity and centroids, moment of inertia, and composite bodies and areas. Credits 3

#### Required Textbooks and Materials

##### *Required Texts*

**R.C. Hibbeler- "Engineering Mechanics- Statics", 13<sup>th</sup> edition, Prentice-Hall.**

#### Suggested Course Materials

##### *Suggested Readings/Texts*

1. BEER and JOHNSON, "Vector Mechanics for Engineers, Statics", sixth Edition, McGraw-Hill
2. Study materials and practice exams from Blackboard
3. FE Reference Manual, National Council of Examiners for Engineering and Surveying

##### *Suggested Materials*

**Go to Blackboard for announcements**

**Student Learning Objectives/Outcomes (Undergraduate)**

This course provides students with the basic tools to understand and apply engineering fundamentals and principles of mechanics, and provides them with the tools for future self-study and development. Upon completion of this course, students should be able to:

SLO		Assessed by	
1	Understand vector mechanics, add and resolve forces in planar and 3D space. Calculate force vectors either in terms of Cartesian components or magnitude/direction	Quiz 1, Quiz 2, Test 1	
2	Understand force system resultants concepts of moment and couple, and reduce distributed loading to a resultant force having a specified location	Quiz 3, Test 1	
3	Draw free-body diagrams and develop the equations of equilibrium of a Particle and Rigid Body. Find support reactions	Quiz 2, Quiz 5, Final Exam	
4	Understand Structural Analysis (Trusses, Frames and Machines). Students will be able to apply equilibrium concept to analyze 2D structural problems. Use method of joint and method of section for truss structures.	Quiz 6, Test 2 , Final Exam	
5	Use the method of section for determining the internal forces in a member of structure.	Quiz 7, Test 3	
6	Calculate Centroid and Moment of Inertia of lines, areas, and composite objects.	Test 3 , Final Exam	
7	Understand the concept of friction and calculate friction forces.	Test 3, Final Exam	
8	Enhance Communication Skills	Project Report	
9	Enhance Critical Thinking Skills	Project Report	

**Required Materials (Topics)**

1. Force vectors
2. Equilibrium of a particle
  - a. Free-Body Diagram
  - b. Two and three-Dimensional force systems
3. Force system Resultant
  - a. Moment of a force
  - b. Resultants of a force and couple system
  - c. Distributed loading
4. Equilibrium of a rigid body
  - a. Free-Body Diagram and equations of equilibrium
  - b. Constraints for a rigid body
5. Structural Analysis
  - a. Truss analysis
  - b. Frame and machines
6. Analysis of internal forces in beams.

7. Friction
8. Center of gravity and Centroids
  - a. System of particles
  - b. Composite bodies
9. Moment of Inertia
  - a. By integration
  - b. Composite areas

**Assignments & Academic Calendar:** See Page 5

### Grading Policy

The weights for each type of evaluation are given below:

Category	Weight
Attendance	5%
Homework	10%
Quiz	15%
Course Project	10%
Tests - Comprehensive	30%
Final Exam - Comprehensive	30%

**Grading Scheme:**  $90 \leq A \leq 100$ ,  $80 \leq B < 90$ ,  $70 \leq C < 80$ ,  $60 \leq D < 70$ ,  $F < 60$ .

Best two out of three exams 30%

Best five out of eight quizzes 15%

### Course Policies

#### *Make-up exams*

Make-up exams and quizzes will be allowed only for an excused absence.

#### *Extra Credit*

Significant contributions in the class, and an assigned extra credit projects will allow you to gain extra points.

#### *Late Work*

Late submittals will be penalized with a loss of 20% of the grade for the particular assignment.

#### *Special Assignments*

Analyze, design, and build a scaled bridge truss for moving load (normally, extra credit project)

#### *Class Attendance*

Class attendance is mandatory. An attendance sheet will be passed in class and it will be the student responsibility to sign the roster. The 5% attendance grade will be deducted if the student has more than three unexcused absences.

#### *Classroom Citizenship*

The students are expected to be on time. Talking or carrying conversations with other students in class is not permitted; this behavior is disrespectful to the faculty and to other students that wish to listen to the lecture.

### ABET Outcomes Assessment

This course will document ABET Outcome *a) an ability to apply knowledge of math, engineering, and science*. The assessment of this outcome will be based on the indicators that include % correctly answered on 10 math, 10 science, and 10 Engineering FE style questions. Also, *outcome e.) An ability to identify, formulate, and solve engineering problems*. The assessment of this outcome will be based on the following four indicators:

- 1.) Identifies problem variables; 2) Selects appropriate model; 3) Makes proper Assumptions; and 4) Applies appropriate analytical solutions.

### **Academic Support**

1. Supplemental Instruction (SI) is available for this course. Days and Times will be posted.
2. Freshmen and sophomores seeking tutorial assistance should contact the Center for Academic Excellence in Hodgin Hall, 3<sup>rd</sup> Floor, 336.285.4088, <http://www.ncat.edu/~cae/home.html>.

### **Technical Support**

If you experience any problems with your A&T account, call AggieTech Support (formerly Help Desk) at 336.334.7195.

### **Field Trip Policies / Off-Campus Instruction and Course Activities**

**Student Affairs website** <http://www.ncat.edu/~staffair/>;

#### **Student Handbook:**

- Go to **A&T's Homepage**
- Go to Left Menu - click **CURRENT STUDENTS**
- Highlight **STUDENT HANDBOOK**

### **Student Travel Procedures and Student Travel Activity Waiver**

<http://businessfinance.ncat.edu/policies%20and%20procedures%20index.htm>

*Off-campus, out-of-state, and foreign instruction and activities are subject to state law and University policies and procedures regarding travel and risk-related activities. Information regarding these rules and regulations may be found at the website address: **Student Travel Procedures and Student Travel Activity Waiver***

<http://businessfinance.ncat.edu/policies%20and%20procedures%20index.htm>.

*Additional information is available from the office of Student Affairs. Please check the website at <http://www.ncat.edu/~staffair/>.*

*Below is a description of any travel and/or risk-related activity associated with this course.*

### **Other Policies (e.g., copyright guidelines, confidentiality, etc.)**

**Student Handbook:** <http://www.ncat.edu/~deanofst/Handbook.htm>

### **Family Educational Rights and Privacy Act**

[http://www.ncat.edu/~registra/ferpa\\_info/index.htm](http://www.ncat.edu/~registra/ferpa_info/index.htm)

### **Student Conduct & Discipline**

North Carolina A&T State University has rules and regulations that govern student conduct and discipline meant to ensure the orderly and efficient conduct of the educational enterprise. It is the responsibility of each student to be knowledgeable about these rules and regulations. Please consult the:

- undergraduate bulletin at [http://www.ncat.edu/~acdaffrs/Bulletin\\_2010\\_2012/toc.htm](http://www.ncat.edu/~acdaffrs/Bulletin_2010_2012/toc.htm)
- graduate catalogue: <http://www.ncat.edu/~gradsch/cstudents.html>, and
- student handbook <http://www.ncat.edu/~deanofst/Handbook.htm>

For detailed information about specific policies, such as academic dishonesty, cell phones, change of grade, disability services, disruptive behavior, general class attendance, grade appeal, incomplete grades, make up work, student grievance procedures, withdrawal, etc.

*These descriptions and timelines are subject to change at the discretion of the professor.*

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Revised 08.17.13

**Textbook:** R.C. Hibbeler- "Engineering Mechanics- Statics", 13<sup>th</sup> Edition, Prentice-Hall.

**HW Assignments**

<b><u>HW#</u></b>	<b><u>Assignment</u></b>
1	2.3, 4, 5, 23, 32, 48, 51
2	2.60, 62, 90, 91, 96
3	3.1, 9, 13, 14, 15, 18
4	3.45, 52, 56, 58
5	4.6, 7, 11, 39, 43
6	4.55, 56, 75, 80, 85, 90
7	4.104, 106, 110, 124, 142, 143
8	5.12, 15, 21, 22, 34, 40, 41
9	6.1, 8, 22, 31, 33, 49
10	7.1, 2, 6, 8, 12
11	8.1, 6, 7, 27
12	9.51, 52, 55, 57