Course Number and Title: CET 258 Statics with Calculus

Campus Location:
Georgetown, Stanton

Effective Date:
2018-52

Prerequisite:
MAT 281, PHY 281 or concurrent

Co-Requisites:
none

Course Credits and Hours:
3.00 credits
3.00 lecture hours/week
1.00 lab hours/week

Course Description:
This course covers particles, rigid bodies, trusses, frames, and machines. Students study rigid objects that are either at rest or move with a constant velocity and that are subject to forces. Topics include calculating forces acting on and within such objects to understand their behavior and to inform their design.

Required Text(s):
Obtain current textbook information by viewing the campus bookstore - https://www.dtcc.edu/bookstores online or visit a campus bookstore. Check your course schedule for the course number and section.

Additional Materials:
None

Schedule Type:
Classroom Course

Disclaimer:
None

Core Course Performance Objectives (CCPOs):

1. Identify, formulate, and solve problems in statics of particles, and two- and three-dimensional rigid bodies. (CCC 1, 2, 3, 4, 5, 6; PGC: CET 1, 2, 4; CTO 1, 2, 3)
2. Identify the properties of force vectors, and distinguish between the concepts and contrasts of center of gravity versus distributed loads, internal versus external loads, and tension versus compression loads. (CCC 1, 2, 3, 4, 5, 6; PGC: CET 1, 2, 4; CTO 1, 2, 3)
3. Calculate moment loads, coupled loads, and replace single forces with a force and a couple. (CCC 1, 2, 3, 4, 5, 6; PGC: CET 1, 2, 4; CTO 1, 2, 3)
4. Draw complex free body diagrams, determine support reactions on static structures, and differentiate between planar versus co-planar forces and concentrated versus distributed loads. (CCC 1, 2, 3, 4, 5, 6; PGC: CET 1, 2, 3, 4; CTO 1, 2, 3)
5. Identify and analyze zero-force/2-force truss members, and determine the resultant forces acting on trusses using both the methods of joints and methods of sections. (CCC 1, 2, 3, 4, 5, 6; PGC: CET 1, 2, 3, 4; CTO 1, 2, 3)
6. Calculate the centroids of both simple and complex structures. (CCC 1, 2, 3, 4, 5, 6; PGC: CET 1, 2, 3, 4; CTO 1, 2, 3)
7. Calculate the moment-of-inertia for both simple and composite areas, and calculate the radius of gyration for an irregular area. (CCC 1, 2, 3, 4, 5, 6; PGC: CET 1, 2, 3, 4; CTO 1, 2, 3)
8. Identify and evaluate the friction laws for dry surfaces, and calculate the coefficients of friction for blocks, wedges, and belts. (CCC 1, 2, 3, 4, 5 ,6; PGC: CET 1, 2, 3, 4; CTO 1, 2, 3)
9. Demonstrate professional and ethical conduct as expected in industry. (CCC 1, 2, 3, 4, 5, 6; PGC: CET 1, 4, 5; CTO 1, 2, 4)

See Core Curriculum Competencies and Program Graduate Competencies at the end of the syllabus. CCPOs are linked to every competency they develop.

Measurable Performance Objectives (MPOs):
Upon completion of this course, the student will:

1. Identify, formulate, and solve problems in statics of particles and two- and three- dimensional rigid bodies.
    1. Identify the standard procedures for performing numerical calculations and for solving problems.
    2. Demonstrate adding and decomposing force vectors.
    3. Solve particle equilibrium problems in 2D and 3D.
    4. Solve rigid body equilibrium in 2D and 3D.
    5. Develop shear force and bending moment diagrams.
2. Identify the properties of force vectors, and distinguish between the concepts and contrasts of center of gravity versus distributed loads, internal versus external loads, and tension versus compression loads.
    1. Illustrate and calculate force vector magnitudes and directions.
    2. Explain the difference between center of gravity versus distributed loads, internal versus external loads, and tension versus compression.
    3. Perform vector addition by graphical representation and summation of components.
3. Calculate moment loads, coupled loads, and replace single forces with a force and a couple.
    1. Calculate moment loads.
    2. Calculate moments by means of moment arms, coupled loads, and force/couple combinations.
4. Draw complex free body diagrams, determine support reactions on static structures, and differentiate between planar versus co-planar forces and concentrated versus distributed loads.
    1. Draw complete free body diagrams of structures in static equilibrium.
    2. Determine support reactions of simple and complex beams.
    3. Identify zero-force, 2-force, and 3-force members.
    4. Differentiate and solve for coplanar-concurrent versus non-concurrent and concentrated versus distributed loads.
5. Identify and analyze zero-force/2-force truss members, and determine the resultant forces acting on trusses using both the methods of joints and methods of sections.
    1. Identify zero-force and 2-force truss members.
    2. Determine truss forces by both the “methods of joints” and “methods of sections.”
    3. Differentiate between the members of a truss and a frame.
6. Calculate the centroids of both simple and complex structures.
    1. Identify and calculate the centroids of simple and complex areas as well as about various lines of reference.
    2. Identify and calculate the center-of-gravity for simple and complex shapes.
7. Calculate the moment-of-inertia for both simple and composite areas, and calculate the radius of gyration for an irregular area.
    1. Determine the moment-of-inertia for simple and complex areas.
    2. Determine the radius of gyration of an irregular area.
8. Identify and evaluate the friction laws for dry surfaces and calculate the coefficients of friction for blocks, wedges, and belts.
    1. Analyze the friction laws for dry surfaces.
    2. Calculate the coefficients of friction and frictional forces on blocks, wedges, and belts.
9. Demonstrate professional and ethical conduct as expected in industry.
    1. Identify the need for self-discipline and time management in technical industries.
    2. Communicate and function effectively as a member of a team.

Evaluation Criteria/Policies:
Students must demonstrate proficiency on all CCPOs at a minimal 75 percent level to successfully complete the course. The grade will be determined using the Delaware Tech grading system:

92	–	100	=	A
83	–	91	=	B
75	–	82	=	C
0	–	74	=	F

Students should refer to the Student Handbook - https://www.dtcc.edu/handbook for information on the Academic Standing Policy, the Academic Integrity Policy, Student Rights and Responsibilities, and other policies relevant to their academic progress.

Final Course Grade:
Calculated using the following weighted average

Evaluation Measure	Percentage of final grade
Exam 1 (Summative)	15%
Exam 2 (Summative)	15%
Exam 3 (Summative)	15%
Group Design Projects/ Laboratory Experiments (Summative)	25%
Assignments (Formative)	30%
TOTAL	100%

Core Curriculum Competencies (CCCs are the competencies every graduate will develop):

1. Apply clear and effective communication skills.
2. Use critical thinking to solve problems.
3. Collaborate to achieve a common goal.
4. Demonstrate professional and ethical conduct.
5. Use information literacy for effective vocational and/or academic research.
6. Apply quantitative reasoning and/or scientific inquiry to solve practical problems.

Program Graduate Competencies (PGCs are the competencies every graduate will develop specific to his or her major):
CETAASCET:

1. Apply the knowledge, techniques, skills, and applicable tools of the discipline to engineering activities, including but not limited to site development, hydraulics and hydrology, grading, and structural systems.
2. Conduct standardized field and laboratory testing on civil engineering project materials.
3. Select appropriate materials and estimate material quantities for technical projects.
4. Use graphic techniques and productivity software to produce engineering documents.
5. Demonstrate a commitment to quality, timeliness, professional development, and continuous improvement.

CETAASCTO:

1. Apply the knowledge, techniques, skills, and applicable tools of the discipline to engineering activities, including but not limited to site development, hydraulics and hydrology, grading, and structural systems.
2. Use graphic techniques and productivity software to produce engineering documents.
3. Apply fundamentals of science and mathematics to solve engineering problems.
4. Demonstrate a commitment to quality, timeliness, professional development, and continuous improvement.

Disabilities Support Statement:
The College is committed to providing reasonable accommodations for students with disabilities. Students are encouraged to schedule an appointment with the campus Disabilities Support Counselor to request an accommodation needed due to a disability. A listing of campus Disabilities Support Counselors and contact information can be found at the disabilities services - https://www.dtcc.edu/disabilitysupport web page or visit the campus Advising Center.