

 Navajo Technical University		http://navajotech.edu
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Course Title: KINEMATICS OF MACHINERY
Course #: ME 331-01

Credit Hours: 3
Semester: Spring, 2022
Cap: 15

Faculty: Alden Yellowhorse **E-mail:** a.yellowhorse@navajotech.edu
Office: TECH 325, Science and Tech. Building **Office Phone:** NA
Office Hours: 9:30 – 10:50 Tu Th F
Preferred Communication (email; will respond within 24 hours)
Class Location: ENGR CLRM
Class Meeting Times: 9:30 – 10:50 M W

Required Materials:

- Textbooks:** Russell C Hibbeler, “Engineering Mechanics: Dynamics”, 14th Edition, Pearson , 2020, ISBN13: 9780136912347.

Mission Statement

Navajo Technical University’s mission is to provide University readiness programs, certificates, associate, baccalaureate, and graduate degrees. Students, faculty, and staff will provide value to the Diné community through research, community engagement, service learning, and activities designed to foster cultural and environmental preservation and sustainable economic development. The University is committed to a high quality, student-oriented, hands-on-learning environment based on the Diné cultural principles: *Nitsáhákees, Nahátá, İna, Siihasin.*

Course Description

The purpose of this course is to teach students to 1) correctly apply basic kinematic terms and concepts, 2) analyze the kinematics of mechanisms and 3) include models of non-idealities such as friction. Multiple aspects of mechanisms will be analyzed. Important mechanism characteristics such as their singularities and non-ideal behavior will be simulated using software.

Course Outcomes	Course Measurements
An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	Project report
The capacity to select appropriate strategies for solving basic kinematic problems	Homework
The ability to construct kinematic models of simple systems	Homework
The ability to include factors such as friction in kinematic models	Homework

Course Activities

Week	Date	Content
1	19-Jan	Introduction, Sections 12.1 – 12.2 velocity and acceleration
2	24-Jan	Section 12.3 velocity and acceleration graphs
	26-Jan	Section 12.4 – 12.5 3D motion
3	31-Jan	Section 12.4 – 12.5 3D motion
	2-Feb	Section 12.6 – 12.7 Projectile motion and vector tangents
4	7-Feb	Section 12.6 – 12.7 Projectile motion and vector tangents
	9-Feb	Section 12.8 Cylindrical coordinates
5	14-Feb	Section 12.9 Coupled motion
	16-Feb	Section 12.9 Coupled motion
6	21-Feb	Holiday
	23-Feb	Section 12.10 Coordinate systems with relative motion
7	28-Feb	Section 13.1 – 13.4 Newton's 2 nd law, inertial frames and 3D motion
	2-Mar	Section 13.5 – 13.6 Tangential motion and cylindrical coordinates
8	7-Mar	Midterm Review
	9-Mar	Midterm Exam
9	14-Mar	Holiday
	16-Mar	Holiday
10	21-Mar	Section 14.1 Work on a particle
	23-Mar	Section 14.2 Work and energy
11	28-Mar	Project day
	30-Mar	Section 14.3 Work, energy and friction
12	4-Apr	Section 14.4 Power and efficiency
	6-Apr	Project day
13	11-Apr	Section 14.6 Conservation of Energy
	13-Apr	Section 15.1 – 15.2 Impulse and momentum
14	18-Apr	Project day
	20-Apr	Section 15.3 Conservation of linear momentum
15	25-Apr	Section 15.4 Impact
	27-Apr	Section 16.1 – 16.2 Planar rigid-body motion
16	2-May	Section 16.3 Rigid body rotation
	4-May	Final review
17	9-May	Final exam

Grading Plan

Homework	35%	A = 100 - 90%
Mid-term	15%	B = 89.9 - 80%
Final Exam	20%	C = 79.9 - 70%
Project	20%	D = 69.9 - 60%
Quizzes	7%	F < 60%
Class Participation	3%	

Grading Policy

Each student must do his or her own homework and case studies. Discussion among students on homework and cases is encouraged for clarification of assignments, technical details of using software, and structuring major steps of solutions - especially on the course's Web site. Students must do their own work on the homework and exam. Cheating and Plagiarism are strictly forbidden. Cheating includes but is not limited to: plagiarism, submission of work that is not the student's own, submission or use of falsified data, unauthorized access to exam or assignment, use of unauthorized material during an exam, supplying or communicating unauthorized information for an assignment or exam.

Participation

Students are expected to attend and participate in all class activities- as listed above, as it **is 3% of the grade**. Points will be given to students who actively participate in class activities including field trips, laboratories, and ask questions of guest speakers and other presenters.

Cell phone and headphone use

Please turn cell phones off or place them on silence or vibrate mode **before** coming to class. Also, answer cell phones **outside of class** (not in the classroom). Exercising cell phone use courtesy is appreciated by both the instructor and classmates. Headphones are to be removed before coming to class.

Attendance Policy

Students are expected to regularly attend all classes for which they are registered. A percentage of the student's grade will be based on class attendance and participation. Absence from class, regardless of the reason, does not relieve the student of his/her responsibility to complete all course work by the required deadlines. Furthermore, it is the student's responsibility to obtain notes, handouts, and any other information covered when absent from class and to arrange to make up any in-class assignments or tests if permitted by the instructor. Incomplete or missing assignments will necessarily affect the student's grades. Instructors will report excessive and/or unexplained absences to the Counseling Department for investigation and potential intervention. **Instructors may drop students from the class after three (3) absences unless prior arrangements are made with the instructor to make up work and the instructor deems any excuse acceptable.**

Study Time Outside of Class for Face-to-Face Courses

For every credit hour spent in a class, a student is expected to spend two hours (2) outside of class studying the course materials.

Study Time for Hybrid or Blended Courses

For a hybrid or blended course of one (1) credit hour, a student is expected to spend three (3) hours per week studying the course materials.

Study Time for Online Courses

For an online course of one (1) credit hour, a student is expected to spend four hours (4) per week studying the course materials.

Academic Integrity

Integrity (honesty) is expected of every student in all academic work. The guiding principle of academic integrity is that a student's submitted work must be the student's own. Students who engage in academic dishonesty diminish their education and bring discredit to the University community. Avoid situations likely to compromise academic integrity such as: cheating, facilitating academic dishonesty, and plagiarism; modifying academic work to obtain additional credit in the same class unless approved in

advance by the instructor, failure to observe rules of academic integrity established by the instructor. **The use of another person's ideas or work claimed as your own without acknowledging the original source is known as plagiarism and is prohibited.**

Diné Philosophy of Education

The Diné Philosophy of Education (DPE) is incorporated into every class for students to become aware of and to understand the significance of the four Diné philosophical elements, including its affiliation with the four directions, four sacred mountains, the four set of thought processes and so forth: Nitsáhákees, Nahát'á, Íina and Siih Hasin which are essential and relevant to self-identity, respect and wisdom to achieve career goals successfully.

Students with Disabilities

The Navajo Technical University and the School of Engineering, Math and Technology are committed to serving all enrolled students in a non-discriminatory and accommodating manner. Any student who feels he/she may need accommodation based on the impact of disability or needs special accommodations should inform NTU in accordance with the procedures of the subsection entitled "Students with Disabilities" under Section 7: Student Support Programs, NTU Student Handbook.