# ENGR 215: Dynamics

# Syllabus Fall 2021

Stephanie Bostwick

[sbostwick@nwic.edu](mailto:mgladstone@nwic.edu)

(360) 392-4275

building #4 office #210

Credits: 5

Class Time: TBD, & Canvas online classroom

Office Hours:

***NWIC MISSION STATEMENT***

*Through education, Northwest Indian College promotes indigenous self-determination and knowledge*

**Course Prerequisites:** ENGR 214.

# Required Text

None.

# Course Description

Covers vector kinematics and kinetics of particles in rectilinear and curvilinear motion and study of rigid bodies in general plane motion. Newton’s Second Law, work and energy, impulse and momentum, and conservation of energy are applied to interactions of bodies and force systems.

# Course Outcomes

# At the completion of this course students will be able to:

1. Apply Newton’s Laws of Motion to particles, systems of particles and rigid bodies
2. Apply kinematics to systems of particles and rigid bodies
3. Apply the principle of work and energy and the principle of impulse and momentum to mechanical systems

# Institutional Outcomes

1. Effectively communicate in diverse situations, from receiving to expressing information, both verbally and non-verbally

1. Meet the technological challenges of a modern world
2. Work cooperatively toward a common goal

**Course Requirements and Expectations**

Students who have a valid issue that prevents them from attending class need to notify the instructor prior to the start of class, email messaging is preferred but phone message is acceptable. It is understood in some situations an absence will be unavoidable. In those situations students will be given the opportunity to make up attendance and participation by watching recordings of the class session that has been missed. Embedded in the recorded class session will be participation questions. If those questions are answered and submitted to the instructor within 1 week of the scheduled class session, attendance and participation points will be awarded based on the agreement reached between student and instructor.

Any exceptions to this attendance policy must be approved by the Department Chair and the instructor in writing before the start of the quarter.

***It will not be possible to earn a passing grade if a student misses more than 30% of this class without notifying the instructor.***

**Evaluation & Assessment**

|  |  |
| --- | --- |
| Homework Problem Presentations | 15% |
| Projects | 10% |
| Mastering Engineering Homework/Canvas | 15% |
| Quizzes | 10% |
| Midterms | 30% |
| Final Exam | 20% |

Grading will be on a percentage system as detailed below:

* 1. Homework Problem Presentations – Each homework assignment will require that select problems are worked out in detail and submitted in class. Late assignments will receive a 10% deduction for each late day past the due date. weight – 15%
  2. Projects - There will be a group project with bi-weekly individual assignments due. This project will be a continuation of work done in Statics and Mechanics of Materials. weight – 10%
  3. Mastering Engineering Homework/Canvas – Homework will be completed online via MyLab. See calendar for due dates. Online assignments in Canvas will be included in this grade. See Canvas for due dates. weight – 15%
  4. Quizzes – There will be daily quizzes at the beginning of class covering topics from the previous class period, excluding exam days. Tuesdays will be individual and Thursdays will be team quizzes with the exception of the first Thursday of class, which will be individual. Students must be in class to take the quiz, including team quizzes. The lowest score will be dropped at the end of the quarter. No makeups. weight – 10%
  5. Midterm Exams – There will be 3 midterm exams throughout the quarter – see Canvas for expected dates. No makeups will be allowed without prior permission given by instructor. weight – 30%
  6. Final Exam – Comprehensive exam at the end of the quarter. No makeups will be allowed without prior permission given by instructor. weight – 20%

Students who have a valid issue that prevents them from attending class please notify the instructor prior to the start of class, email messaging is preferred but phone message is acceptable. It is understood in some situations an absence will be unavoidable. In those situations students will be given the opportunity to make up attendance and participation.

Any exceptions to this attendance policy must be approved by the Department Chair and the instructor in writing before the start of the quarter.

***It will not be possible to earn a passing grade if a student misses more than 30% of this class without notifying the instructor.***

# Course and Assignment Schedule:

|  |  |  |
| --- | --- | --- |
| Tentative Schedule | | |
| **Week** | **Topics** | **Reading** |
| 1 | Course Overview  Rectilinear Kinematics | 12.1-12.3 |
| 2 | Curvilinear Motion  - Rectangular components  - Projectile motion  - Normal/Tangential components  - Cylindrical Components | 12.4-12.8 |
| 3 | Relative Motion  Newton’s Second Law  Equations of Motion  - Rectangular components | 12.9-12.10  13.1-13.4 |
| 4 | **Exam 1 Monday**  Equations of Motion  - Normal/Tangential components  - Cylindrical Components  Work and Energy | 13.5-13.6  14.1-14.4 |
| 5 | Conservation of Energy  Linear Impulse and Momentum | 14.5-14.6  15.1-15.2 |
| 6 | Conservation of Linear Momentum  Impact  Angular Impulse and Momentum  Mass Flow  **Exam 2 Friday** | 15.3-15.8 |
| 7 | Planar Kinematics of a Rigid Body  Rotation about a fixed axis  Relative-Motion Analysis | 16.1-16.8 |
| 8 | Planar Kinetics of a Rigid Body  Mass Moment of Inertia  Equations of Motion  **Exam 3 Friday** | 17.1-17.4 |
| 9 | Work-Energy methods for Rigid Bodies | 18.1-18.5 |
| 10 | Impulse-Momentum methods for Rigid Bodies  Eccentric Impact | 19.1-19.4 |
| 11 | 3-D Kinematics of a Rigid Body | 20.1-20.4 |
| Finals | Review  **Final Exam Wednesday** |  |

**Instructor(s) Discretion:**

Should it be deemed necessary, the instructor(s) of this course reserves the right to make alterations, at any time, to the course materials or what is contained within this syllabus in order to improve the course itself, the learning environment or the opportunity for student success. If such a change is made, it will be made in a timely manner so as not to impede the learning process or interfere, in any way, with student success.