1. KOCW Course Plan/ Syllabus

Course Title	Physics for Engineers
Year/ Semester	2025/ 1
Course Type	Major
Course Credits	2
Content Length	___360__ min.

Week	Topic/ Learning Objectives	Teaching and Learning Methods	
		Main Content	Materials
1	Unit Conversion - Understanding Unit Conversion - Converting Single Units - Converting Units to a Power - Multiple Unit Conversion	Unit 1 mp4 file	PPT file (Intro & Summary.ppt) PDF file (Unit Conversion.pdf)
2	Vectors - Scalar and Vector Quantities - Vector Notation in Polar Coordinates - Vector Notation in Rectangular Coordinates - Conversion Between Coordinate Systems - Vector Angle Conventions	Unit 2 mp4 file	PPT file (Vectors.ppt)
3	Vector Mathematics - Vector Addition - Commutative Law Graphically - Vector Negation and Vector Subtraction - Direction Unit Vectors - Applications of Direction Unit Vectors - Direction Cosines	Unit 3 mp4 file	PPT file (Vector Mathematics.ppt)
4	The Dot Product - The Dot Product - Derivation - Vector Separation Angle - Collinear and Orthogonal Properties - Unit Vector Dot Products	Unit 4 mp4 file	PPT file (The Dot Product.ppt)

	- Expanded Dot Product - Commutative Property		
5	Applications of The Dot Product - Vectors and Direction Angles in Three Dimensions - Magnitude of Three Dimensional Vectors - Direction Cosines Equation in 3-D - Position Vectors - Using Position Vectors to Define Forces - Direction Angles with Multiple Solutions	Unit 5 mp4 file	PPT file (Applications of The Dot Product.ppt)
6	The Cross Product - Definition of the Cross Product - Anti-commutative Law - Evaluating Determinants - Cross Product Magnitude and Separation Angles - Collinear and Orthogonal Vectors - Applications and Examples	Unit 6 mp4 file	PPT file (The Cross Product.ppt)
7	Kinematics - Position Vectors and Displacement - Average and Instantaneous Velocity - Average and Instantaneous Acceleration - Derivation of Kinematic Equations - Kinematic Equation Vector Diagrams - Consistency of Units in Equations - Overview of Kinematic Equations	Unit 7 mp4 file	PPT file (Kinematics.ppt)
8	Applications of Kinematics - Review of Basic Kinematic Equations - Graphical Representation of Velocity vs Time - Vector Synthesis Example - Displacement Example - Vector Derivatives with Example - Example with Non-constant Acceleration - Average Velocity vs Resultant Vector	Unit 8 mp4 file	PPT file (Applications of Kinematics.ppt)
9	Gravity and Kinematics - Kinematic Equations Under Gravity - Apex of Trajectory (Maximum Height) - Times of Flight (Rise and Drop Times) - Final Velocity - Piecewise Solutions - Drop Time vs Distance	Unit 9 mp4 file	PPT file (Gravity and Kinematics.ppt)

10	Projectile Motion - Projectile Motion (Parabolic Trajectories) - Maximum Trajectory Height - Range and Velocity - Piecewise Solutions - Energy Conservation - Equations as Functions of Launch Angle - Parabolic Equation (y as a function of x)	Unit 10 mp4 file	PPT file (Projectile Motion.ppt)
11	Applied Projectile Motion - Range on a Multi-level Surface - Maximum Range Launch Angle - Launch Angle versus Flight Times and Ranges - Simultaneous Launches - Trajectory Shape - Downward Launch Angles - Targeting	Unit 11 mp4 file	PPT file (Applied Projectile Motion.ppt)
12	Future Trajectories - Future Areas to Explore - Friction and Rotation - Curvature - Optics - Wire Spool and Friction - Line of Sight Distance on the Earth - The Infinity Mirror	Unit 12 mp4 file	PPT file Future Trajectories (Intro & Summary.ppt) PDF file (Line of Sight Distance on the Ocean.pdf) PDF file (Wire Spool.pdf) PDF file (Infinity Mirrors (Curved).pdf)