

# AP PGECET 2025 Geo Engineering & Geo Informatics Syllabus

## Engineering Mathematics Syllabus

Linear Algebra	<ul style="list-style-type: none"><li>● Matrix algebra</li><li>● Systems of linear equations</li><li>● Eigenvalues and eigenvectors</li></ul>
Calculus	<ul style="list-style-type: none"><li>● Functions of a single variable</li><li>● Limit, continuity, and differentiability</li><li>● Mean value theorems</li><li>● Evaluation of definite and improper integrals</li><li>● Partial derivatives</li><li>● Total derivative</li><li>● Maxima &amp; minima</li><li>● Gradient/ divergence/ curl</li><li>● Vector identities</li><li>● Directional derivatives</li><li>● Line/ surface/ volume integrals</li><li>● Stokes, Gauss, Green's theorems</li></ul>
Complex Variables	<ul style="list-style-type: none"><li>● Analytic functions</li><li>● Cauchy's integral theorem</li><li>● Taylor and Laurent series</li></ul>
Probability & Statistics	<ul style="list-style-type: none"><li>● Definitions of probability and sampling theorems</li><li>● Conditional probability</li><li>● Mean/ median/mode/ standard deviation</li><li>● Random variables</li><li>● Exponential/ poisson/ normal/ binomial distributions</li></ul>
Geo-Engineering	<ul style="list-style-type: none"><li>● Continents</li><li>● Earth composition</li><li>● Earth: orbit</li><li>● Ocean: depth/ bottom/ relief</li><li>● Rocks: kind of rocks (sedimentary, igneous, metamorphic rocks origin &amp; classification), minerals (silicate minerals and non-silicate minerals), physical properties of</li></ul>

	minerals
Surveying Methods	<ul style="list-style-type: none"> <li>• Topographic surveying</li> <li>• Theodolite applications</li> <li>• Topographic sheets</li> <li>• Aerial photo formats</li> </ul>
Maps	<ul style="list-style-type: none"> <li>• Types of photographs: vertical &amp; oblique photographs</li> <li>• Aerial camera: lens, optical axis, focal length, focal plane and fiducial marks, principal point</li> <li>• Geometry of vertical photographs map projections</li> <li>• Fundamentals of cartography</li> </ul>
Physical Principles of Remote Sensing/ Electromagnetic Spectrum	<ul style="list-style-type: none"> <li>• Electromagnetic radiation</li> <li>• Velocity of EM radiation</li> <li>• Propagation of EM waves</li> <li>• Fundamentals of radiometry</li> <li>• Measure geometry concept of solid angle</li> <li>• Radiometric quantities</li> <li>• Classification of remote sensor</li> <li>• Selection of sensor parameters</li> <li>• Spatial resolution</li> <li>• Spectral resolution</li> <li>• Radiometric resolution</li> <li>• Temporal resolution optical &amp; infrared microwave sensors</li> <li>• Sun-synchronous and geosynchronous satellites - Land coverage/ repetitivity</li> <li>• Along track and across track stereovision capability</li> <li>• IRS/ LANDSAT/ SPOT/ CANADA/ JAPAN/ EUROPEAN/ Satellite series</li> </ul>
GIS Concepts	<ul style="list-style-type: none"> <li>• Components of GIS - Hardware/ Software/ data files/databases</li> <li>• Data types database structures: Hierarchial/ network/ relational vector data structure</li> <li>• Vector data model - Arcs</li> <li>• Storing area - database</li> </ul>

creation/digitizer

- Topology: Euler equation/ topological consistency/ topological errors/ digital elevation models
- Data transformation: change in dimensionality
- Change in position: Rubber sheeting
- Tin sheeting: vector to raster
- Raster to vector conversion vector data - polygon overlay/polygon statistics
- Network analysis: Non spatial data analysis
- Structures query language
- Modeling - definition/ spatial modeling / external model/ conceptual model
- Logical model
- Internal model: GIS applications in resource management data capture using GPS for GIS FM studies
- Object oriented database models
- Recent trends in GIS and applications
- Study of rainfall
- Estimation of run-off and evapotranspiration
- Water table environment - meaning/ scope/ components environment
- Soil textures/ strengths/ porosity/ permeability