



SWARNANDHRA

(AUTONOMOUS)

COLLEGE OF ENGINEERING AND TECHNOLOGY
SEETHARAMAPURAM, NARSAPUR-534280, W. G. DT., A. P.

Course File & Plan: IGPS

Acc. Year: 2025-2026

Program & Semester: B. Tech-VII

DEPT. OF ELECTRONICS AND COMMUNICATION ENGINEERING

LESSON PLAN (2025-2026)

Course Code	Course Title	Semester	Branches	Contact Periods / Week	Academic Year	Date of Commencement of Semester
20EC7001	IGPS	VII	CSE-A & C, MECH-ROBOTICS	4	2025-26	09-06-2025
COURSE OUTCOMES						
1	Describe the concepts of GPS-based positioning methods, the core components of a satellite navigation system and their purposes (K1).					
2	Estimate and represent the GPS coordinate frames and GPS orbits (K2).					
3	Analyze the impact of various error sources on the precision of positioning (K3).					
4	Dramatize the examples of their role of goods and services based on the GSP in sustainable development (K4)					
Unit	Out Comes / Bloom's Level	Topics No.		Text Book Reference	Contact Hour	Delivery Method
UNIT-I: OVERVIEW OF GPS						
I	CO1: Describe the concepts of GPS-based positioning methods, the core components of a satellite navigation system and their purposes. (K1, K2)	1.1.1	Basic concept about GPS	T1	1	Chalk, talk
		1.1.2	Basic concept about Frequencies	T1	1	Chalk, talk
		1.1.3	System architecture	T1	1	Chalk, talk
		1.1.4	System architecture-SS, US, CS	T1	1	Chalk, talk
		1.1.5	Space segment -GNSS Satellites	T1	1	Chalk, talk
		1.1.6	Space segment	T1	1	Chalk, talk
		1.1.7	User segment -Receiving Signals	T1	1	Chalk, talk
		1.1.8	User segment	T1	1	Chalk, talk
		1.1.9	Control Segment-Master Control, Base Station	T1	1	Web Resources
		1.1.10	Control Segment	T1	1	Chalk, tal
		1.1.11	Services of GPS	T1	1	Web Resources
		1.1.12	Applications of GPS	T1	1	Chalk, talk
			Class Test-I		1	
Total					13	
UNIT-II: GPS SIGNALS						
	CO2: Describe the concepts of GPS-based positioning methods, the core components	2.1.1	Basic Signals-L1, L2, L3, L4 & L5.	T1	1	Chalk, talk
		2.1.2	Signal structure-Signal frequencies	T1	1	Chalk, talk
		2.1.3	Signal structure	T1	1	Chalk, talk
		2.1.4	Spoofing (S)	T1	1	Web Resources
		2.1.5	Anti-spoofing (AS)	T1	1	Chalk, talk
		2.1.6	Selective availability	T1	1	Chalk, talk



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II	of a satellite navigation system and their purposes (K2).	2.1.7	GALILEO Satellite	T1	1	Chalk, talk
		2.1.8	GPS Satellite	T1	1	Chalk, talk
		2.1.9	Difference between GPS and GALILEO satellite construction.	T1	1	Chalk, talk
			Class Test-II		1	
Total					10	
UNIT-III: GPS COORDINATE FRAMES, TIME REFERENCES						
III	CO3: Estimate and represent the GPS coordinate frames and GPS orbits (K3).	3.1.1	What is Geodetic	T1	1	Chalk, talk
		3.1.2	Geodetic coordinate systems	T1	1	Chalk, talk
		3.1.3	What is Geocentric	T1	1	Chalk, talk
		3.1.4	Geocentric coordinate systems	T1	1	Chalk, talk
		3.1.5	ECEF coordinate world geodetic 1984 (WGS 84)	T1	1	Web Resources
		3.1.6	GPS time	T1	1	NPTEL video
			Class Test-III		1	
Total					7	
UNIT-IV: GPS ORBITS AND SATELLITE POSITION DETERMINATION						
IV	CO4: Analyze the impact of various error sources on the precision of positioning (K4).	4.1.1	Orbital Parameters	T1	1	PPT
		4.1.2	GPS orbital parameters	T1	1	Chalk, talk
		4.1.3	What is RINEX	T1	1	Web Resources
		4.1.4	Description of receiver independent exchange format (RINEX)–	T1	1	Chalk, talk
			Observation data	T1	1	Chalk, talk
		4.1.5	Navigation Message	T1	1	PPT
		4.1.6	Navigation message data parameters	T1	1	Chalk, talk
			GPS position determination	T1	1	Chalk, talk
	Content beyond Syllabus (if needed)		Precise Orbital Determination (POD), Reference Frames and Time Standards, Keplerian and Perturbed Orbital Elements & Satellite Position via Broadcast Ephemeris.		1	Chalk, talk, ppt
			Class Test-IV		1	
Total					10	
UNIT-V: GPS ERRORS						
V	CO5: Dramatize the examples of their role of goods and services based on the GSP in	5.1.1	Error models	T1	1	Web Resources
		5.1.2	GPS error models	T1	1	Chalk, Talk
		5.1.3	Error Sources	T1	1	Web Resources
		5.1.4	GPS error sources	T1	1	Chalk, Talk
		5.1.5	– clock error	T1	1	Chalk, talk, ppt
		5.1.6	Ionospheric error	T1	1	PPT



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sustainable development (K4).	5.1.7	Tropospheric Errors	T1	1	Chalk, Talk
	5.1.8	Multipath error	T1	1	Chalk, Talk
	5.1.9	Delay errors	T1	1	Web Resources
	5.1.10	Atmospheric delay errors	T1	1	Chalk, Talk
	5.1.11	Receiver noise	T1	1	Web Resources
	5.1.12	Ionospheric effects	T1	1	Chalk, Talk
	5.1.13	Ionospheric effects on GPS signals	T1	1	Web Resources
		Class Test -V			1
Content beyond Syllabus (if needed)	Ionospheric Errors (Advanced Concepts), Tropospheric Errors (Non-Dispersive), Satellite Clock and Ephemeris Errors & Multipath Errors (High-Level).			1	Web Resources
Total					15
CUMULATIVE PROPOSED PERIODS					55

Text Books:

S. No. AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION

1 G. S. RAO, Global Navigation Satellite Systems, 2nd Edition, McGraw-Hill publications, New Delhi, 2010. (UNIT-I-V)

Reference Books:

S. No. AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION

- 1 B. Hoffman – Wellenhof, H. Liehtenegger and J. Collins, „GPS – Theory and Practice“, 4th Edition, Springer – Wien, New York ,2001. (UNIT-I-III)
- 2 Sateesh Gopi, “Global & System: Principles and Applications”, 3rd Edition, TMH, 2005. (UNIT-I-II)
- 3 James Ba – Yen Tsui, „Fundamentals of GPS receivers – A software Approach“, 3rd Edition, John Wiley & Sons,2001. (UNIT-IV-V)
- 4 Elliot D. Kaplan, “Understanding GPS Principles and Applications”, 2nd edition, Artech House, 2005. (UNIT-I-III)

Web Details

- 1 <https://www.unoosa.org/oosa/sk/ourwork/psa/gnss/gnss.html> 2.
- 2 https://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/navservices/gnss/gps/how_it_works/
- 3 <https://www.princeton.edu/~alaink/Ocf467F07/GNSS.pdf>
- 4 <https://www.euspa.europa.eu/european-space/eu-space-programme/what-gnss> 5.
<https://www.gps.gov/systems/gnss/>



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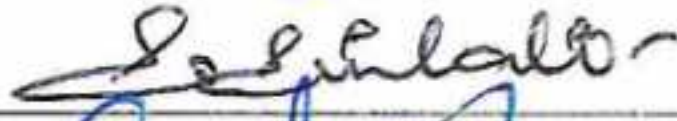
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		Name	Signature with Date
i.	Faculty	Dr. S. Silali	
ii.	Faculty II (for common Course)	Mr. D. Rahul Khanna	
iii.	Course Coordinator	Dr. S. Srilali	
iv.	Module Coordinator	Dr. Sekhar Didde	
v.	Programme Coordinator	Dr. B. S. Rao	


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