

Course Unit Description - (SIPOE)

(Spatial Positioning Systems)

(Mestrado em Engenharia Electrotécnica e de Computadores)

Academic year: 2008/2009



Subject group: Electrónica e Telecomunicações

	Semestral	Compulsory	
Mode of study	Diurno	Hours/Week	T-Teórica 2
Year	1 ^o		PL-Prática-Laboratorial 2
Semester	1 ^o		OT-Orientação Tutorial 1

ECTS 6

Objectives

This course provides a broad technical introduction to Global Navigation Systems from the perspective of end user. It is directed toward those students who will have a need to apply a basic technical understanding of positioning and guidance to their daily activities and responsibilities. Students should be prepared for technical content, but without complex mathematics or theory. Students who will benefit include:

- * End-users of GNSS/DGNSS and augmentations services
- * Surveying engineers and technicians
- * Mobile robotics, geodesy, or competitive navigation
- * Wireless carriers needing an understanding of satellite networks
- * Customers/users of satellite telecommunications equipment

Course Contents

Navigation Principles of Positioning and Guidance. Radionavigation.
Global Positioning Systems.
Understanding Global Positioning/Navigation Satellite Systems - GNSS Principles and Applications. NAVSTAR-GPS, GLONASS, Galileo and COMPASS Systems. Augmentation Systems (WAAS, EGNOS, MSAS, etc.).
Regional Positioning Satellite Systems, Inertial Navigation and Integration.
Integrated Navigation: Kalman filtering. Typical multisensor systems: GNSS and dead reckoning, GNSS and INS, GNSS and Loran-C, NAVSTAR-GPS, GLONASS and Galileo.
Accuracy with GNSS.
Conventional, Specific and other Applications (Geodesy and Timing).
Differential GNSS - DGNSS and Virtual Reference Stations - VRS.

Recommended reading

- 1 - GNSS: Global Navigation Satellite Systems, GPS, GLONASS, Galileo & more, Hofmann-Wellenhof, Lichtenegger, H., Wasle, E., Springer Verlag, 1^a Edição, Viena, Nova York, 2008.
- 2 - Global Positioning System: Theory and Practice, B. Hofmann-Wellenhof, H. Lichtenegger, 3^a Ed.
- 3 - Understanding GPS Principles and Applications, Kaplan, Elliott D, Artech House, Inc., 2^a Ed, 2007.
- 4 - Global Positioning System: Theory and Applications, Vol. 1, Parkinson, B., Spilker, J., Penina Axelrad and Per Enge, 1996.
- 5 - SIPOE2008 e SI, M. G. Soares, ISEP, 2008.
- 6 - Real Time Internet DGPS Service, M. G. Soares, B. Malheiro e F. Restivo, SCI2003.
- 7 - High Precision Navigation With GPS Satellites, M. G. Soares, F. Restivo, FITCE, Salónica, 1997.
- 8 - <http://www.bipm.fr/>.

Teaching Methods

Theoretical lectures with live student participation. Some experimental lessons will take place.

Assessment methods

A final written examination will be presented to the students. Theoretical and practical problems will also be submitted in this written final examination.

	Name
Teacher responsible:	()
Lecturer:	Manuel Goncalves Soares (MGS)

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