a) General			
School	ENGINEERING		
Academic unit	MECHANICAL ENGINEERING		
Level of studies	Undergraduate		
Course code	MM004Y02	*Semester*	4
Course title	**Industrial measurements: principles and applications**		

Independent teaching activities	*Weekly teaching hours*	*ECTS*
Lectures	4	6.5
Laboratory exercises	1	

Course type	General background
Course category	Compulsory
Prerequisite courses	-
Language of instruction and examinations	Greek
Is the course offered to Erasmus students	No
Course website (url)	https://eclass.uniwa.gr/

b) Learning outcomes and general competences

b1. Learning outcomes

Upon successful completion of this course, the student will be able to:

- Distinguish between precision and bias measurement errors and their sources (calibration errors, reading errors, etc.)
- Estimate the uncertainty of independent variables from sampled sets of measurements and of variables which are depended on the measured data sets (propagation of error).
- Describe time varying signals in both the time and frequency domains.
- Describe the underlying physical principles governing the behavior of commonly used sensors.
- Understand the relationship between the physical properties of a sensor and its time and frequency response when used in a measurement system.
- Process a signal from a sensor by using appropriate techniques (amplification, filtering, etc.), record the signal using an electronic data acquisition system (analog or digital), convert it to the appropriate units, and calibrate the sensor and data acquisition system.
- Make engineering measurements of physical quantities such as temperature, force and strain, using multiple instruments
- Present data in an appropriate manner through the use of tables and graphs
- Communicate effectively in written form information relating to the design and/or results of an engineering experiment.

b2. General competences

- Adapting to new situations
- Decision making
- Working independently
- Team work
- Search for, analysis and synthesis of data and information with the use of the necessary technology

c) Syllabus

Theory: Basic concepts and Terminology of Measurement Methods. Static and dynamic characteristics of signals (Frequency Analysis). Statistical Analysis of Signals. Uncertainty

analysis. Signal Conditioning. Sampling, Digital Devices and Data Acquisition. Response of Measurement Systems. Strain or Temperature Measurements. Technical Writing.

Lab: The course includes practical training in the lab and extensive use of SCADA and data/numerical analysis software (LabVIEW, MATLAB/OCTAVE/SCILAB).

d) Teaching and learning methods - Evaluation

Delivery	Face-to-face, Distance learning.	
Use of information and communications technology	- Commercial/free/open source software - Multimedia applications - MS Teams/eclass	
Teaching methods	*Activity*	*Semester workload*
	Lectures	39
	Tutorials	13
	Laboratory exercises	13
	Computational exercises	
	Individual work	104
	Course total	169
Student performance evaluation	Theory: Intermediate assessment and written final examination. Laboratory: Individual and/or group assignments and written or oral examination or presentation, per exercise and per case of study.	

e) Suggested bibliography

1. Figliola, R.S. and Beasley, D.E., (2010). *Theory and Design for Mechanical Measurements*. (5th Ed.). John Wiley. [Available textbook in Greek].
2. Beckwith, T.G., Marangoni, R.D., and Lienhard, J.H. (2006). *Mechanical Measurements*. (6th Ed.). Pearson.
3. Dunn, P., (2010). *Measurement, Data Analysis, and Sensor Fundamentals for Engineering and Science*. (2nd Ed.). CRC Press.
4. Holman, J.P. (2011). *Experimental Methods for Engineers*, (8th Ed.). McGraw-Hill.
5. Rajput, R.K. (2016). *Electrical and Electronics Measurements and Instrumentation*. (4th Ed.) S. Chand.
6. Wheeler, A.J., and Ganji, A.R., (2009). *Introduction to Engineering Experimentation*. (3rd Ed.). Prentice Hall.
7. Teaching notes in Greek, based on the above mention English textbooks.