Cím	*Measurement Technology 2*
Tárgykód	*IVB267ANVM*
Heti óraszám: ea/gy/lab	*1/0/2*
Kreditpont	*4*
Szak(ok)/ típus	*Electrical Engineering BSc*
Tagozat	*-*
Követelmény	*Signature with semester-grade*
Meghirdetés féléve	*4*
Előzetes követelmény(ek)	*Measurement Technology 1*
Oktató tanszék(ek)	*Dept. Of Electrical Networks*
Tárgyfelelős és oktatók	*Dr. István GYURCSEK*

TANTÁRGY CÉLKITŰZÉSE

The measurement (and especially electrical measurement) is one of the most important part of all sort of engineering. This course is the short collection of the fundamental principles is given helping to understand the basics of measurement technology i.e. the basics of testing theories, instruments, methods and practical solutions.

TARTALMA

Rövid leírás:

This subject covers the fundamental principles of the electrical measurement technology that is required to the study of students attending the B.Sc. program. It aims to increase students' knowledge and expertise and determine whether they satisfy the requirements of the course.

The aim of the subject is to convey fundamental knowledge on the measurement theory as well as principles of operation of different sort of testing instruments, measurement methods. The aim of the subject is also to convey knowledge on theories and methods of sensor technology. Measurement methods for mechanical parameters, temperature and different kind of radiations are also included.

Topics:

Lectures:

The semester is divided into three principle periods and attendant exercises. The rough outline of the schedule is as the followings:

SENSOR THEORY

Sensors theory (classification from energy point of view, two-port equivalence, static and dynamic sensor models, sensor charracteristics, classification based on Miller-index)

MEASUREMENT SIGNAL PROCESSING

Analogue signal processing, digital signal processing, computer measuring systems

BASIC SENSOR NETWORKS

Measurement network architectures (network architectures, source - device interconnections, noise handling, groundings and earths)

Sensor signal transmissions (base band and carrier band transmissions, chopper, fiber and wireless transmissions, remote sensing, smart sensors, SCADA and DCS systems, embedded technologies)

MEASUREMENT APPLICATIONS WITH SENSORS

- Temperature measurements (RTD, NTC, PTC, pn-junction sensors, thermocouples, pyrometers)
- Radiation measurements (characteristics of electromagnetic spectrum, photo-conductive and photo-electric measurements, color measurement, imaging systems, RF and IR measurements, quantum detectors, GM indicators, scintillation detectors, direct radiation measurements)
- Mechanical measurements (force torque, pressure measurement, strain gauges, position detection, tachometers, acceleration detectors, acoustic measurements)
- Non-destructive moisture diagnostic (fundamental methods, practical applications)

Seminars/ Lab works:

1. Measurement of magnetic characteristics (#07)
2. Measurement of frequency, period and RPM (#08)
3. Measurement of 'switch-on' transients (#12)
4. Measurements of force, torque, and acceleration (#16)
5. Measurements with inductive displacement sensors (#17)
6. Temperature dependency of Zener diode (#18)

The timetable for the semester is given in followings.

Week	Topic	Communications (MS Teams)	Sources (NMS Docs)	Additional materials	Skill check (NMS, unipoll)
1	Sensor theory	Online presentation Online consulting	(2) 5.10-SEN.pdf	(1) Chapter 4	NMS voting
2					
3	Sensor networks	Online presentation Online consulting	(2) 7.10-MNET.pdf	(1) Chapter 5	NMS voting
4					
5	Mid-term test	MS Teams chat	-	-	UniPoll E-exam
6					
7	Break	-	-	-	-
8					
9	Temperature tests	Online presentation Online consulting	(2) 8.10-TMP.pdf	(1) Chapter 6.1	NMS voting
10					
11	Radiation tests	Online presentation Online consulting	(2) 8.20-RAD.pdf	(1) Chapter 6.2	NMS voting
12					
13	Mechanical tests	Online presentation Online consulting	(2) 8.30-MCH.pdf	(1) Chapter 6.3	NMS voting
14					
15	Mid-term test	MS Teams chat	-	-	UniPoll E-exam

SZÁMONKÉRÉSI ÉS ÉRTÉKELÉSI RENDSZERE

Részvétel:

Attending is required all classes according to the possibility of online education and will impact the grade. Unexcused absences will adversely affect the grade and in case of absence from more than 30% of the total number of lessons will be grounds for failing the class. To be in the class at the beginning time and stay until the scheduled end of the lesson is required. Tardiness of more than 20 minutes will be counted as an absence. In the case of an illness or family emergency the student must present a valid excuse, such as a doctor's note.

Aláírás / Félévközi jegy feltétele:

The requirement is two approved classroom studies, scheduled during the semester and the accepted performance in lab exercises scheduled for the semester terminus. The semester grade of the midterm performance will be based on the following guidelines:

5. Outstanding work. Execution of work is thoroughly complete and demonstrates a superior level of achievement overall with a clear attention to details. The student is able to synthesize the course material with new concepts and ideas in a thoughtful manner and is able to express those ideas in clear way.

4. High quality work. Student work demonstrates a high level of knowledge with consistency. The student demonstrates a level of thoughtfulness in addressing concepts and ideas. Work demonstrates excellence but less consistency than a '5' student.

3. Satisfactory work. Student work addresses all of the task and assignment objectives with few minor or major problems.

2. Less than satisfactory work. Work is incomplete in significant ways and lacks attention to details.

1. Unsatisfactory work. Work exhibits several major and minor problems with basic conceptual premise, lacking both intention and resolution. Results are severely lacking and are weak in clarity and completeness.

Grading Scale:

Numeric Grade	5	4	3	2	1
Evaluation interval	90-100%	76-89%	63-75 %	51-62 %	0-50 %

Vizsga: írásbeli/szóbeli, eredményes: min.: 51%

Az érdemjegy kialakításának módja:

The semester grade is calculated as weighted average of lab preparation (30%), lab protocol (30%), lecture midterm tests (40%).

KÖTELEZŐ ÉS AJÁNLOTT IRODALOM

[1]   Dr. Gyurcsek: Fundamentals of Electrical Measurements, PTE MIK 2019
        ISBN 978-963-429-384-2
[2]   Neptun Meet Street documents related to the course
[3]   Jacob Fraden: Handbook of Modern Sensors, Springer NY. 2010
        ISBN 978-1-4419-6465-6
[4]   S. Tumanski: Principles of electrical measurement, CRC Press 2006
        ISBN 0-7503-1038