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LEARNING UNIT PLAN

DALFYS

DAta Literacy competences For Young students towards STEAM education

2020-1-IT02-KA226-SCH-095305

Title	Verification of the nominal value of electrical resistance by means of an experimental laboratory test
Outcome	Students will be able to verify the actual value of an electrical resistance, build an electrical circuit, report the data on a graph
Target (indicate the age of students)	16-17 age
Pre-requisites (indicate what student should know before starting this learning unit contents)	Ohm's law and applications Know the volt-ampere method for measuring an electrical resistance know a data management software (excel ...)
Period of application (indicate when you start and when you end the learning unit)	October - November 2022
Assessment (how does this lesson relate to assignments/homework/readings)	self-assessment of knowledge by checking the data shown in the table
Goals of the unit	<ul style="list-style-type: none">• Make correct voltage and current measurements• Store, manage and organise digital data, information and content• Compare nominal and actual values of an electrical resistor through measurements• Facilitate student's understanding of data• Knowing how to write a technical report

Competence/s	<ul style="list-style-type: none"> ● Presentation of the laboratory test for verifying the nominal value of an electrical resistor ● Laboratory test: Assembly of the circuit and measuring instruments ● Processing of the data collected and construction of the graph ● Drafting of the technical report <p><u>DALFYS competencies</u></p> <p>DATA COLLECTION</p> <ul style="list-style-type: none"> ● <u>Knowledge:</u> knowing where else (strategic transfer) ● <u>Skills/Capabilities:</u> developing, constructing, transferring ● <u>Attitude/Values:</u> incorporation <p>DATA SECURITY</p> <ul style="list-style-type: none"> ● <u>Knowledge:</u> knowing where else (strategic transfer) ● <u>Skills/Capabilities:</u> developing, constructing, transferring ● <u>Attitude/Values:</u> incorporation <p>DIGITAL CONTENT DEVELOPMENT</p> <ul style="list-style-type: none"> ● <u>Knowledge:</u> knowing where else (strategic transfer) ● <u>Skills/Capabilities:</u> developing, constructing, transferring ● <u>Attitude/Values:</u> incorporation
Evaluation	The final evaluation will concern the presentation of the technical report
Description of the steps	
1st step	
Name of the teacher: Calvaruso G. - Isca M. S. Subject: Electronics	
Knowledge	Skills
Measurement circuit	Series circuit with resistor generator, ammeter connected in series and voltmeter in parallel
Organization of data for the survey of electrical quantities	Report the measurement data in a two-column table
Mathematical relationships: Ohm's law, tolerance, percentage, etc.	Mathematical formulas: Ohm's law, percentage tolerance; comparison between measured and calculated value
Content:	Ohm's Law - Measurement of voltage and current

Description of the Activity:	<ul style="list-style-type: none"> ● Presentation of the volt amperometric method for calculating an electrical resistance ● electrical circuit and insertion of measuring instruments ● preparation of a table for the measurement of voltage and current ● organization of the table for data processing
Time (indicate how many hours of lessons are needed)	1 hour
Used resources:	Youtube videos, computer lab
Students accomplishment:	Students will have to check the actual value of an electrical resistor
Method	Frontal lesson
Tools	IWB (interactive white board) - Computer Lab
2st step	
Name of the teacher: Calvaruso G. - Isca M. S.	
Subject: Electronics	
Knowledge	Skills
Assembly of the circuit and measuring instruments	Assembly of the circuit in the laboratory by correctly connecting the various elements
Vary the generator voltage in steps of 0.5V and take the measured voltage and current values read in the measuring instruments	Carry out the measurement procedure to measure the voltage and current electrical quantities at the ends of the electrical resistor
Record the measured values in the table	Report the measured values in the correct format in the table
Content:	
Electric circuit series, voltage and current measurements	
Description of the Activity:	<ul style="list-style-type: none"> ● Mount the circuit ● Read the voltage and current values and report them in the table
Time (indicate how many hours of lessons are needed)	3 hours
Used resources:	Electronics laboratory
Students accomplishment:	Assemble the circuit and operate on it
Method	Cooperative learning - laboratory teaching -
Tools	Computer LAB - IWB (interactive white board)
3st step	
Name of the teacher: Calvaruso G. - Isca M. S.	
Subject: informatics	
Knowledge	Skills
Enter the data collected in the excel spreadsheet for subsequent processing	Enter numeric data in the spreadsheet in the correct format

Process data using excel functions	Carry out the ratio $R = V / I$ for each survey test and the average of the R values calculated in the 10 tests; use of the percentage function to calculate the percentage tolerance
Construction of the V-I graph	Know the procedure for building the graph (electrical characteristic of the resistance)
Content:	Ohm's law, formulas for calculating tolerance, use of the Excel spreadsheet
Description of the Activity:	<p>Open an excel spreadsheet</p> <p>Prepare it in the correct format for entering the collected and calculated data</p> <p>Enter the formulas to calculate the R value, the mean RM value, and the mean percentage tolerance value T%</p> <p>Construct the graph (almost linear) using the measured data</p>
Time (indicate how many hours of lessons are needed)	2 hours
Used resources:	<p>Computer lab</p> <p>youtube video: https://www.youtube.com/watch?v=sDuXPYHywYk</p>
Students accomplishment:	Realization of the graph
Method	Laboratory teaching – Cooperative learning
Tools	Computer lab -
4st step	
Name of the teacher: Calvaruso G. - Isca M. S.	
Subject: Drafting of the technical report	
Knowledge	Skills
Draw up the technical report with the compilation of the predefined format provided by the teacher	<ul style="list-style-type: none"> Knowing how to write a technical report Knowing how to express considerations on the correctness of the calculated values compared to the nominal ones Determine if the test was successful or not
Content:	Knowing how to describe and present the results obtained
Description of the Activity:	<p>Fill in the technical report following the steps proposed by the format</p> <p>Export the graphs, the measurement circuit; write the formulas used in order to provide scientific validation to the test</p> <p>Express considerations on the correctness of the calculated values compared to the nominal ones and establish if the resistance and tolerance values are consistent with the nominal ones</p>
Time (indicate how many hours of lessons are needed)	3 hours
Used resources:	Computer lab

Students accomplishment:	Students will present the technical report and express considerations on the correctness of the data presented
Method	Laboratory teaching – Cooperative learning
Tools	Computer lab