RULES OF THE SUBJECT

Physics Laboratory for Civil Engineers, 2024 Spring Semester

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There will be *two home projects* related to the mechanics measurement and to the thermodynamics measurement, respectively, and *one measurement* in optics. Before starting the projects or the measurement, it is mandatory to read the laboratory notes found on the webpage of the subject:

http://physics.bme.hu/BMETE11MX22_kov?language=en

Here one can find the schedule of the semester, as well. In general, pairs of students will work on the projects and on the measurements. Before the occasions individual test has to be written by every student to measure they prepardeness. The test can be solved easily if somebody reads the *laboratory notes. In the beginning of the semester (practically, on the second week of the semester) introductory occasions will be held for the Tuesday and Wednesday groups, respectively. This occasion is mandatory (there will be no measurement).*

Mechanics and Thermodynamics Project

The project has two parts:

– In the first one (test part) the students have to answer a few questions related to the measurement (mechanics or thermodynamics depending on the schedule). The test contains problems of type multiple-choice questions or simple calculations. This part has to be done at the time of the occasion (see the schedule) by using Moodle. The test must be done without using any help (laboratory notes, class mate, etc.) except calculator (and pen, and paper for calculations). **The test is individual.** In total 25 points can be acquired in this part.

– In the second part (simulation part) by using programs simulated measurements must be done **by the groups**[1], and the data must be evaluated. This part starts on Wednesday for both groups (Tuesday and Wednesday groups). The projects will be uploaded *as Assignments* in Moodle. Every group has one week (project due date) to complete the project and upload a single pdf (project report; one pdf per group). This file should contain all data, screenshots, plots, evaluations (the used formulas, as well), and short discussion (1-2 sentences) about the results. There is no need to provide abstract, introduction, theoretical summary, etc. If you make a graph, make sure that labels, units are present. In total again 25 points can be gathered in this part.

All in all 50 points can be given for a project.

Optics Measurement

This measurement has to be done in the laboratory (Building F3, second floor, right hand) *by groups*. One group contain two students. Every student can measure only at the assigned time, changing is not permitted. The measurement has two parts:

– In the first one (test part) the students have to answer a few questions related to the measurement (optics). The test contains problems of type multiple-choice questions or simple calculations. This part has to be done at the time of the occasion (see the schedule) by using Moodle. The test

[1] One group contains two students. For forming the groups, every student can choose their partners. For this we use Moodle, also.

must be done without using any help (laboratory notes, class mate, etc.) except calculator (and pen, and paper for calculations). **The test is individual.** In total 25 points can be acquired in this part.

– In the second part each group starts the measurement in the laboratory. During the measurement the *data has to be recorded and the answer sheet must be filled by every group* (use the laboratory note meanwhile since the measurement tasks can be found there; answer sheet will be given by the instructor in the laboratory). The answer sheet will be collected by the instructor at the end of the measurement. Copy of the answer sheet will be provided to the groups. Some parts of the answer sheet can be answered later after evaluating the recorded data (these are indicated as homeworks). *Similarly to the project reports, the answers of these parts have to be uploaded as a pdf document in Moodle by every group with the deadline of one week (next Tuesday or Wednesday midnight, i.e. 23:59:59).* In that case if the group(s) cannot finish the evaluation during the class, they can evaluate it at home, and they must send it together with the homework until the deadline. During the class if it is seen that the measured data are wrong, the data must be measured again. If it is seen after the class, this must be indicated in the answer sheet, and other group's data should be taken (which must be indicated, as well) but only the data, the evaluation must be done by the group members. **Reports are not accepted**. With the answer sheet at most 25 points can be acquired.

In total 50 points can be reached by a measurement.

General Information

To complete the subject one has to reach at least 10-10 points in both parts and at least 25 points within one measurement or project. The grading scheme:

– 0-74: Mark 1 (insufficient)

– 75-94: Mark 2 (sufficient)

– 95-112: Mark 3 (ordinary)

– 113-130: Mark 4 (good)

– 131-150: Mark 5 (excellent)

In Moodle a sample test can be found, similar questions will be be given in the tests.

It is allowed to be late with one project report or the homework only once. In this case at most one additional week can be provided (cut-off date of project reports and homework of the measurement). If somebody is late again, -10 points penalty is given for one week late. Assignment closes one week after the due date (closing date).

In case of copying (if there is clear evidence), the project report or the homework of the measurement cannot be accepted and the subject cannot be completed. If the threshold level is not reached, it is mandatory to participate in the repetition occasion. During this occasion only a single measurement can be repeated. (In case of two failed masurements, the mark becomes 1 (insufficient) automatically, and the subject cannot be completed). The repetition can be done online. During the repetition occasion one can improve the score of the project or homework however, the new score overwrites the previous one even if the previous one is better.

In case of questions, communication can be held via email. Consultation can be held upon students' request.

Additional Information

Three measurements are:

- *Mechanics project*: Standing waves in stretched elastic string
- *Thermodynamics project*: Calorimetry, measuring heat of solution
- *Optics*: Focal length of lenses, refraction index of a prism, polarization, Michelson interferometer

Safety information (accident prevention and fire protection)

In case of accident, the instructor must be informed immediately. There are no dangerous measurements, but

- take care of yourself and watch out for the others and the equipments;
- do not eat in the laboratory;
- do not let the laser light get into the eyes;
- wall socket: 230 V, do not put banana plug into it (in this case at the other end of the plug 230 V could be obtained) banana plug can be used only for low voltages, in case of electric shock: do not touch that person, as soon as possible turn off the main power switch belonging to the workplace (one workplace means one room, red one turns off, green turns on) and we should call the ambulance, in serious shock we have to give first aid;
- always put back the seat under the desk if you do not sit during the measurement;
- in case of fire: turn off the power, use fire extinguisher, call the fire fighters, escape the room;
- if an equipment/device goes bad (or does not work properly) it should be told the instructor immediately, do not connect an ammeter directly to a voltage supply (short circuited) this breaks the ammeter and /or the safety fuse;
- no break will be held during the measurement (however students can take break if they want for a short time but the exercise must be finished by 17:15). In other cases the corresponding section of the TVSZ (Regulation of Studies and Exams) has to be referred.