

Instructions of the exercise problems

Features of systematic problems solving

Ability for systematic problem solving is very important because it eases solving challenging problems and improves academic skills. A logical answer is also easier to follow.

- ☐ Explain the new variables and give their units.
 - E.g., V^+ = voltage of a signal propagating to positive z direction, unit V.
- ☐ Sketch a clear figure of the situation, mark the used variables, dimensions, vectors etc. into the figure. This makes it easier to piece together the situation.
- ☐ Justify the applied principles or theories physically and explain how they relate to the given problem. Find out in which section of the course book (or other source) this information can be found.
- ☐ Give a source of information, especially if it is other than the course book. This is important for the confirmation of the information. Formulas of the course book can directly be cited using the number (x.x.)
- ☐ Let your answer proceed systematically and explain the main principles even though they have not been explicitly asked.
- ☐ Write all the intermediate steps of a mathematical solution clearly so that you understand them. Give assumptions you use.
- ☐ If a numeric final answer is asked, substitute the numerical values to the formula with the units. Make sure that the unit of the end answer is correct.
- ☐ Give the final answer in the same number of significant digits as the most inaccurate starting value, but use more significant digits in the intermediate phases.
 - E.g., if the starting value is a physical quantity, e.g., voltage $V = 1.0$ V (two significant digits!), give the final answer also using two significant digits, too. This is because the physical, measurable value is not fully accurate.
- ☐ Ponder whether your final answer makes sense. Justify the answer based on physical understanding. Typical problems of this course have a simplified connection to the real world. It is recommended to use common sense, too!

Returning your answers

- The exercise problem answers are to be returned during the contact sessions to the course teachers either handwritten (on paper) or typescripted (shown on screen). For other return methods, contact the teachers.
- Return your answers one by one when a teacher is free. You may also ask help and instruction.
- Be prepared to explain and justify your answer to the teacher. The purpose of this returning method is to enhance your learning through two-way communication and constructive feedback given by the teacher. The teacher will grade your answer in the scale of 0-3 points, see the criteria below.
- Note that at least two (2) of the problems must be returned weekly. If you cannot meet this, you lose a chance to earn those points. However, if you have a good reason not to meet the DL, contact the teachers well in advance. The optimal return rate is about three (3) returned problems per week ☺

Grading criteria of the exercise answers:

- 3 p = “**Excellent**”: Both the written answer and the oral explanation prove that the student masters the topic of the problem fluently. The answer and explanation are solid and mainly blameless.
 - 3 p may also be granted even though the student has made a mistake but fixed it and he/she is able to explain the reason and after the correction proves very good command of the topic.
- 2 p = “**Good**”: Both the written answer and the oral explanation prove that the student masters the topic of the problem fairly good. However, the answer or explanation contains some **shortcoming**, for instance,
 - there is a clear, unexplained mistake, but the basic principles are valid,
 - the intermediate steps are partly missing or the explanation is somewhat narrow or vague,
 - a part of the answer (e.g., 1/3) is missing,
- 1 p = “**Satisfactory**”: Both the written answer and the oral explanation show that the student masters the topic of the problem only satisfactory. The answer and/or explanation contains **significant shortcomings**, for instance,
 - there is a significant mistake, but some correct principles have been presented,
 - essential intermediate steps or all explanations are lacking, or
 - a significant part of the answer (e.g., 1/2 ... 2/3) is missing
- 0 p = “**Poor answer**”: There is a fatal mistake, wrong principles applied, more than 2/3 of the answer is lacking, or the answer has been copied.