

Learning Toolkit: Exercises

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For first-year Bachelor
students of EPFL



In this toolkit

- Scientific research-based advice
- Facing new problems
- What to do during exercises sessions
- What to do after the sessions when you study at home

Facing New Problems

The 4-steps Polya's problem-solving technique



“It’s taking time... and it’s okay!”

Do NEVER
solve the
exercises with
the solutions

- Understanding by reading *is not* knowing how to do once at the exam
- 1. Always try to solve the exercises by yourself, alone
- 2. If you are blocked after providing substantial effort:
 - *Ask for help (TAs, friends..)*
 - *Check the solutions, but actively: follow the problem-solving method*
 - *Later, come back to this exercise and solve it again without the solutions*

Think
before solving
problems

1. **ANALYZE** the problem
 - *What type of problem are you facing?*
 - *Do you visualize the problem?*
 - *Can you restate the problem and its goals in your own words?*
2. **PLAN** a possible solution
 - *Can you use a similar problem solved before, or methods seen in class?*
 - *Do you evaluate the possible strategies and choose the best one?*
3. **SOLVE** following your plan
 - *Check the assumptions that apply*
 - *Are you getting lost in calculations?*
4. **CHECK** your solution!

During Exercises Sessions

Being active and
asking questions



“The correct answer? I don’t care!”

Actively
process the
exercises

- After trying to solve the exercise alone, ask your friends for help!
- Discuss in small groups
 - *Listen to each other*
 - *Speak quietly to keep good working conditions in the room*
- **You are all teaching assistants!**
 - *Explain with your own words*
 - *Give feedback to each other...*
 - *...including on the problem-solving approach itself*

Ask
questions, ask
for feedback

- Don’t be afraid of TAs, we are here **for you!**
- In learning, there are no stupid questions, there are no stupid answers
- You are allowed to answer incorrectly and do mistakes, like anyone learning
- **Feedback is your best friend**
 - *Feedback on specific problems or concepts*
 - *Feedback on your problem-solving skills*
 - *Ask for feedback to the TAs, and use it to progress towards “perfection”*

And After?

Learn how to be
your own manager



“I don't rush to the solution anymore”

Step back
and analyze
your own
learning

- Did you follow the right methodology?
- Did you forget important concepts or tools introduced in the lecture?
- **Evaluate** your own problem-solving skills: what will you transfer to future problems?
- **Write a summary** in two sentences:
 - *What was the right / most efficient solving method to use? Any traps to avoid?*
 - *If you were blocked: write yourself a hint that you will use when you will come back to this exercise later in the semester*

Space
your revisions

- **Ideally**, try to:
 1. Study a same course over several days in a week
 - *For instance: TU = class, TH = class + exercises, SA = exercises + recap*
 - *At home, spend 30% of your time on reviewing the course material and 70% on practicing through exercises*
 2. Review the course material that you have learned 3-4 weeks ago
 - *For instance, review what you have learned in Week 1 during Week 4, Week 2 during Week 5, etc..*
- **Difficult to do...** it's okay, just do your best

Summary

- 4 steps to solve any problem
- We are here to help you
- Mistakes are allowed and part of any learning
- Having the correct answer is cool, understanding the process to get it is even better
- The importance of feedback



Evidence About Learning

This is the **worst** error you can possibly do!!

Do NEVER solve the exercises with the solutions

Think before solving problems

Follow the problem-solving methodology

Solve the problems in small groups!

Actively process the exercises

Ask questions, ask for feedback

- Asking questions is essential in learning
- Feedback has the biggest positive impact on learning

Pay attention to what you are doing!

Step back and analyze your own learning

Space your revisions

Fight against the Ebbinghaus forgetting curve!

Let's goooo!

Feel free to contact me if you have further questions

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