

STEM SUCCESS: METACOGNITIVE LEARNING STRATEGIES

Studying is not just an activity that you do but a skill that you should put effort into improving. Metacognition means actively reflecting on your own thinking and learning process, setting goals for your learning, and monitoring your progress toward becoming better learners. The following learning strategies will help you become proactive and better learners.

General Strategies

- While in high school, you can get by with **remembering** and **understanding** the materials, in college you need to start **applying, analyzing, evaluating,** and **creating** knowledge (see [Bloom's taxonomy of learning](#))
- Have a **growth mindset**: your academic performance is the result of efforts rather than abilities.
- **Set SMART goals** for each study session
- [Use the Study Cycle](#)
- Remember to take breaks, nourish yourself, sleep well, and take care of your health

Weekly Studying

- Use syllabus, textbook, lecture slides to get a **preview** of the big picture of what you are learning. This helps the brain to recognize and process much more information.
- **Come up with your own questions** before getting started to make the learning process more fun
- **Do your homework problems as if they are an exam** (e.g. study the materials before starting; only check the answers after you've made a serious attempt; compare your approaches with the answer guide)

Exam Preparation

- In addition to mock exams professors give you, **create your own practice exams** using lecture notes, homework assignments, quizzes, textbook questions
- **Teach** the materials to a (real or imagined) group
- Review [test-taking tips](#)

Utilize Resources Around Campus

- Go to your **professors' office hours**. See [5 topics you can discuss with profs](#)
- Go to Guided Study Sessions
- Use [free tutoring resources](#) available for many STEM classes
- Review more academic success resources collected by UMD [here](#)

Start to Think like a Scientist

Science is not about memorizing definitions, facts, and formulas. It is a **process of inquiry** that uses logical reasoning and evidence to **discover patterns, relationships, and the underlying principles**. When you are studying, always question yourself:

- How does this system/formula/mechanism work?
- Why is this important to know? What kind of problems would require knowing this? Where else would this information be relevant?
- What is the evidence? How do we interpret this evidence?
- Are there alternative explanations or other ways of solving the problem?
- How is this similar to or different from other things I've learned?
- How is this material connected to other information in the same topic? Unit? Course?
- What questions do I have?