HOW TO STUDY EFFECTIVELY FOR YOUR STEM COURSES

Based on “Teach Yourself How to Learn, Strategies You Can Use to Ace Any Course at Any Level, by Saudra Yancy MeGuire
COGNITION VS META-COGNITION

COGNITION
(mental processes)
- memory, learning and problem solving
- attention and decision making

METACOGNITION
(higher order cognitive processes)
- a person has active control over his cognition
- thinking about thinking

Metacognition

The ability to:

- think about your own thinking
- be consciously aware of yourself as a problem solver
- monitor, plan, and control your mental processing (e.g. “Am I understanding this material, or just memorizing it?”)
- accurately judge your level of learning
- know what you know and what you don’t know

Bloom’s Taxonomy

- **Rememb**er
  - Recall facts and basic concepts
    - Define, duplicate, list, memorize, repeat, state

- **Understand**
  - Explain ideas or concepts
    - Classify, describe, discuss, explain, identify, locate, recognize, report, select, translate

- **Apply**
  - Use information in new situations
    - Execute, implement, solve, use, demonstrate, interpret, operate, schedule, sketch

- **Analyze**
  - Draw connections among ideas
    - Differentiate, organize, relate, compare, contrast, distinguish, examine, experiment, question, test

- **Evaluate**
  - Justify a stand or decision
    - Appraise, argue, defend, judge, select, support, value, critique, weigh

- **Create**
  - Produce new or original work
    - Design, assemble, construct, conjecture, develop, formulate, author, investigate

Reflection Questions

• What’s the difference, if any, between *studying* and *learning*?

• For which task would you work harder?
  A. Make an A on the test
  B. Teach the material to the class
How do we teach students to move 
*higher* on Bloom’s Taxonomy?

Teach them the Study Cycle*

*adapted from Frank Christ’s PLRS system*
The Study Cycle

**Preview before class** – Skim the chapter, note headings and boldface words, review summaries and chapter objectives, and come up with questions you’d like the lecture to answer for you.

**Attend class** – GO TO CLASS! Answer and ask questions and take meaningful notes.

**Review after class** – As soon after class as possible, read notes, fill in gaps and note any questions.

**Study** – Repetition is the key. Ask questions such as ‘why’, ‘how’, and ‘what if’.
- Intense Study Sessions* - 3-5 short study sessions per day
- Weekend Review – Read notes and material from the week to make connections

**Assess your Learning** – Periodically perform reality checks
- Am I using study methods that are effective?
- Do I understand the material enough to teach it to others?

**Assess**

**Study**

**Review**

**Attend**

**Preview**
## Intense Study Sessions

<table>
<thead>
<tr>
<th></th>
<th>Task Description</th>
<th>Time</th>
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<tbody>
<tr>
<td>1</td>
<td>Set a Goal</td>
<td>1-2 min</td>
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<td>Decide what you want to accomplish in</td>
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<td></td>
<td>your study session</td>
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<td>2</td>
<td>Study with Focus</td>
<td>30-50 min</td>
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<td>Interact with material- organize,</td>
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<td>concept map, summarize, process, re-</td>
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<td>read, fill-in notes, reflect, etc.</td>
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<td>Do homework problems like test problems</td>
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<td>3</td>
<td>Reward Yourself</td>
<td>10-15 min</td>
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<td>Take a break– call a friend, play a short</td>
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<td>game, get a snack</td>
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<td>4</td>
<td>Review</td>
<td>5 min</td>
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<td>Go over what you just studied</td>
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Effective Homework Strategy

• **Study material first**, before looking at the problems/questions

• **Work example problems** (without looking at the solutions) until you get to the answer

• **Check** to see if **answer** is correct

• If answer is not correct, **figure out where mistake was made**, without consulting solution

• **Work homework** problems/answer questions as if taking a test