How to be a Proactive Math Learner
Learning Outcomes

Students will be able to…

• Estimate their college workload
• Develop strategies for active listening
• Take notes in class and while doing homework
• Develop skills for studying
• Assess if they have learned topics discussed in class
• Develop strategies for time management
Estimating Workload
Estimating Workload

The number of credits of a course corresponds to the *minimum* amount of work you should expect for the course.

The expected workload should also be listed in your syllabus for the course.

In general, for every credit you should expect at least 2 hours outside of class. This includes reading, homework, studying, rewriting notes, etc.
## Minimum Workload – Outside of class

<table>
<thead>
<tr>
<th>Class</th>
<th>Credits</th>
<th>Minimum Workload per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math 96</td>
<td>3</td>
<td>6 hours per week</td>
</tr>
<tr>
<td>Math 112</td>
<td>3</td>
<td>6 hours per week</td>
</tr>
<tr>
<td>Math 113</td>
<td>3</td>
<td>6 hours per week</td>
</tr>
<tr>
<td>Math 114</td>
<td>5</td>
<td>10 hours per week</td>
</tr>
<tr>
<td>Math 171</td>
<td>5</td>
<td>10 hours per week</td>
</tr>
<tr>
<td>Math 211</td>
<td>5</td>
<td>10 hours per week</td>
</tr>
<tr>
<td>Math 213</td>
<td>3</td>
<td>6 hours per week</td>
</tr>
<tr>
<td>Math 221</td>
<td>5</td>
<td>10 hours per week</td>
</tr>
<tr>
<td>Math 222</td>
<td>4</td>
<td>8 hours per week</td>
</tr>
<tr>
<td>Math 234</td>
<td>4</td>
<td>8 hours per week</td>
</tr>
</tbody>
</table>
Be honest with yourself about the amount of time you are working on your classes.

If it is a class, you don’t like or struggle with, you may need to spend more time on it not less.

These numbers are estimates, your workload will vary at different times of the semester. Try to stay as consistent as possible but know that you may have weeks that you have extra work.
Active Listening

Listening with all of your senses
Active Listening

Learn your instructor’s lecture style.

Be a participant in class.

If you are confused, someone else probably is also. Be brave and ask a question.

Try to sit next to someone who is listening as intently as you. If you miss something, chances are they might have picked it up. Compare notes after class. (Hint: this is also a great way to form a study group.)
Important topics...

Instructor Actions:

- Writing on the board
- Summarizing
- Pausing
- Repeating Statements
- Enumerating
- Working several examples of the same type
- Explaining bold-print words

Instructor says:

- “This is a tricky problem”
- “This is the most difficult step”
- “These types of problems will be on the test”
- “This will be on the test”
- “This is where many students make mistakes”
Note Taking
Taking Notes

Develop a method that works for you – this may be different from other classes.

Use Active Writing techniques:

- Handwrite your notes (paper or tablet).
- Think about what you are writing.
- Star or write questions down as you are going.

Color code your notes.

Write down comments the instructor says, not just what is written on the board.
Notetaking Methods

- Cornell Method
  - keywords, cues
  - summary
  - notes

- Malekpour Method
  - questions
  - summary
  - steps in your own words
  - connections
  - examples
  - notes

- Three-columns Method
  - keywords, cues
  - notes
  - questions, connections, steps, examples...
Revise after class

1. Rewrite the material you cannot read or will not be able to understand a few weeks later.
2. Fill in the gaps
3. Add additional key words and ideas
4. Create a problem log of the problems worked in class
5. Reflect and synthesis
Glossary

Make your own math glossary

Deeply understand each term

Mathematics terms are exact

Highlight key words in each definition

What is the term saying

What is the term not saying
Frayer Model

<table>
<thead>
<tr>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristics</td>
<td>Non-Example</td>
</tr>
</tbody>
</table>

Term
Write at least one complete example of problems done in-class or discussion.

Write down at least one complete example of homework problems from your online homework.

**Complete Example** includes the problem statement, *all* the steps of the problem, the solution, and any notes about unclear or tricky steps.

**Avoid** doing work in your head. On exams you are assessed on what your write, so get in the habit of writing your work. If you are unsure of what this looks like, ask your instructor or TA.
Online Homework

DO:
Write out the problems
Attempt homework without looking at notes
Keep practicing until you have understanding

DON'T
Use “Help me” just to get an answer
Do work in your head
“Google” solve
Study Techniques
Make flash cards

Tricky definitions

Formulas – try to understand how the formula works

Things to look for

General equations you need to memorize

Bring the flash cards with you and review them in your spare time.
A diagram or graphical tool that visually represents relationships between concepts and ideas. Usually, they are structured hierarchically and connected with lines or arrows.

There are many free concept map makers online.

Miro – lets you collaborate with people.
Concept Mapping
Calculus

Concept Map

General

- slopes
- rates of change
- optimization problems

- derivative at a point
  - derivative rules
    - power
    - multiplication
    - chain
    - division
  - ways to find $\frac{dy}{dx}$
  - parts of derivatives
    - antiderivative
    - applications
  - things related to math
    - calculus
    - integrals
    - diff equations

- rate of change
  - synonymous with instantaneous rate of change
Create a study group

Ask the people around you in discussion or lecture if they would like to get together to study.
Make a group chat with people.
Meet up and do homework together.
Explain the problems to each other – even if you all know how to do it.
Start trying to make test questions.
Practice

Don’t practice until you get it right.

Practice until you can’t get it wrong.
Have you studied enough?
Plan, Monitor, and Evaluate

**Plan** – understand what the problem wants, develop strategies to solve the problem, identify potential obstacles, predicting the outcome.

**Monitor** – putting the steps in order, identifying and finding errors, determine if additional information is needed, knowing when to use a different strategy, knowing you have part of the answer.

**Evaluate** – determine if the answer seems correct, evaluating the answer, performing an inverse operation, measuring the efficiency of the plan and monitoring.
Checking your understanding

Try to explain the concepts to a friend that doesn't know the material.

Look at a problem and try it on your own. If you need to look at your notes, you should determine where you are struggling.

Be honest with yourself – if you have to pattern match to complete your homework ask for help.
Habits to avoid

Taking pictures of the board *instead* of taking notes. (If you miss part of a problem, take a picture so you can transfer it.)

Relying on a classmate for notes.

Pattern matching to get your homework done. Make sure you understand the steps involved.
Places to get help

Office hours with your TA or instructor

Math Learning Center has drop-in tutoring and peer mentoring for almost every course
Time Management
How are you feeling most days?

Are you turning in work at the last minute almost every time?

Do you feel like you don’t have time to complete household chores

Do you feel like you are on top of most of your work?

What would you like to do differently to make effective use of your time?
Time management

There is no perfect solution for everyone

If you are trying something new – try it for 3 weeks.

If you deviate from the plan, that’s ok. Analyze why you had to deviate and move forward.
First step

Look ahead – find out when you will have your big projects, papers and exams.

Plan the little things when you don’t have big things going on.
Calendar coding

Use Outlook or Google calendar

Color code by course, personal, relaxation, etc.

Schedule as much as you can – with travel times
Resources
Write things down so you don’t have to keep thinking of them.

If you have a short amount of time, do some small tasks.

Block off large amounts of time for large tasks.
<table>
<thead>
<tr>
<th>To Do</th>
<th>Doing</th>
<th>Done</th>
</tr>
</thead>
</table>
Weekly Schedule

- Class time
- Work time
- Eating
- Personal care
- Study time
- Relaxation time
- Time with friends
- Sleeping
Planned vs. Actual

Plan your week on a Sunday evening
Refer to your monthly calendar for big items
Keep track of the time you spend on each task
Compare it to what you planned
Give yourself some grace if it is different than planned
Analyze (without judgement) what was different
Make a new plan for the following week
Study Goals

Use SMART goals

Plan a realistic amount of time to study.

On your Monthly Calendar, plan when to start studying
When you are ready to study

1. Turn off notifications
2. Put your phone on airplane mode
3. Find an appropriate place for you
4. Try to go to the same place for the same course
Celebrate the little things

- Reward yourself for little tasks completed
- Break large tasks into very small tasks
No system is perfect

Find things that work for you
Combine techniques
Try things for 3 weeks, then adjust
Be honest with yourself if something isn’t working
Questions?