

## HOW TO STUDY MATH AND SCIENCE

### PREVIEWING

- ✓ Before class briefly preview the text material that will be covered in the lecture.
  - Get an overview of the material by reading the introductory and summary passages, section headings and subheadings, and diagrams.
  - Look at the problems at the end of the chapter.
  - Review (if necessary) old terms and definitions referred to in the new material.
  - Formulate possible questions for class.

\*Remember, the purpose of previewing is not to understand the material but to get a general idea of what the lecture will cover. This should not be a very time-consuming process.

### NOTE-TAKING

- ✓ When taking notes in class, listen actively; Intend to learn from the lecture.
  - Write down the instructor's explanatory remarks about the problem.
    - **Note how he/she gets from one step of the problem to another.**
    - Note any particular conditions of the problem.
    - **Note why the approach to the problem is taken.**
- ✓ Try to anticipate the consequences of a theorem or the next step in a problem. During a proof, keep the conclusion in mind.
- ✓ Note any concepts, rules, techniques, problems that the instructor emphasizes.
- ✓ Question your instructor during class about any unclear concept or procedure.
- ✓ Write down what you can, especially key words.
- ✓ As soon as possible after class, summarize, review, and edit your notes.
  - Note any relationship to previous material; i.e., write down key similarities and differences between concepts in the new material and concepts in previously learned material.
- ✓ Review your notes at regular intervals and review them with the intent to learn and retain the information.

### TEXT READING

- ✓ You can use your text to help supplement pieces you missed from a lecture, or use the lecture to fill in pieces from the text.

- ✓ Briefly preview the material. Get an overview of the content and look at the questions at the end of the chapter.
- ✓ Read actively to understand thoroughly.
  - o Formulate questions before you read (from lecture notes or from previewing) and read to answer those questions.
  - o Know what every word and symbol means.
  - o Translate abstract formulas to verbal explanations.
  - o Analyze the example problems by asking yourself these questions:
    - What concepts, formulas, and rules were applied?
    - What methods were used to solve the problem? Why was this method used?
    - What was the first step? Try and Explain in your own words.
    - What differences or similarities are there between the examples and homework problems?
    - Draw your own diagrams to illustrate and explain problems.
  - o Check to see how the material relates to previous material.
    - How are they different?
    - The same?
    - What new concepts were introduced and how were they applied?
    - Where does this material "fit" within the overall structure of the course?
- ✓ Stop periodically and recall the material that you have read.
- ✓ Review prerequisite material, if necessary.

### **PROBLEM SOLVING**

\*\*\*Solving problems is usually the most important aspect of math or science courses. You must, therefore, spend much of your study time either working or studying problems. When working a problem, follow these steps:

- ✓ Clearly state what is given and expected.
- ✓ Once you have a plan, carry it out. If it doesn't work, try another plan.
- ✓ Check your solution. Don't be discouraged if incorrect. Try again!

- o Check to see if the answer is in the proper form.
- o Insert your answer back into the problem.
- o Make sure your answer is "reasonable."

\*\*\*During the problem solving process, it is often helpful to say out loud all of the things you are thinking. This verbalization process can help lead you to a solution.

### PROBLEM ANALYSIS

- ✓ Focus on the processes used (not the answer) and ask yourself these questions:
  - o What concept, formulas, and rules did I apply?
  - o What methods did I use?
  - o How did I begin?
  - o How does the solution compare with worked examples from the textbook or my notes?
  - o Can I do this problem another way? Can I simplify what I did?
- ✓ Explain each step using your own words. Write these explanations on your paper.

### TEST PREPARATION

If you have followed an approach to study as suggested in this handout, your preparation for exams should not be overly difficult. Consider these procedures:

- ✓ Quickly review your notes to determine what topics/problems have been emphasized.
- ✓ Look over your notes and text. Make a concept list in which you list major concepts and formulas which will be covered.
- ✓ Note similarities and differences among problems. Do this for problems within the same chapter and for problems in different chapters.
- ✓ **Review and rework homework problems, noting why the procedures applied.**
- ✓ Locate additional problems and use them to take a practice test. Test yourself under conditions that are as realistic as possible (e.g., no notes, time restriction, random sequence of problems, etc.)
- ✓ **Also, try to predict test questions. Make up your own problems and practice working them.**

### TEST TAKING

- ✓ Glance over the whole exam quickly, assessing questions as to their level of difficulty and point value. Also get a sense of how much time to spend on each question. Leave time at the end to check your work.

- ✓ Begin to work the problems which seem easiest to you. Also give priority to those problems which are worth the most points.
- ✓ **Important: Show all of your work.**
- ✓ If you have difficulties with a problem, skip it and return to it later.

### TEST ANALYSIS

Analyzing returned tests can aid your studying for future tests. Ask yourself the following questions:

- ✓ Did most of the test come from the lecture, textbook, or homework?
- ✓ How were the problems different from those in my notes, text, and homework?· Where was my greatest source of error (careless errors, lack of time, lack of understanding of material, uncertainty of which method to choose, lack of prerequisite information, test anxiety, etc.)? **NOTE: This is useful for any course!**
- ✓ How can I change my studying habits to adjust for the errors I am making?

**IMPORTANT: The knowledge of most math/science courses is cumulative. Many concepts build on previous concepts, and a poor understanding of one concept will likely lead to a poor understanding of future concepts. Consequently, you should seek help early if you encounter difficulty.**