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Studying

How Much Time is Enough?
You will have less “free” time and less time to learn course material than you had in high school. In high school you spent approximately 150 total hours per course, including in-class instruction and testing. You may have studied a total of five to ten hours per week, and it’s possible that your teachers used class time to help you review for exams.

At Rensselaer, you will spend somewhere between 38 to 50 total hours per course, including in-class instruction and testing and most professors will not use class time for review. What you learned in 40 weeks in high school, you will learn in 15 weeks at Rensselaer.

If you are taking 16 credits (four 4-credit courses) in one semester, then you will need to study 32 hours each week in addition to the time you spend attending your classes.

How Do You Define “Studying”?  
Studying means reading your textbook, practicing the example problems and doing extra problems to make sure that you recognize what to do when the problem changes, and making crib sheets to summarize and review material. See Attachment 1 for making a crib sheet. You must work to understand WHAT you are doing as well as WHY you are doing it. You also need to practice doing problems quickly so you can complete them within the time allotted for taking an exam.

Developing Effective and Efficient Study Habits
It’s important to review and study the material that you learn in class each day. The farther away from the lecture that you review the material, the less information you will retain. Studies indicate that if we don’t review what we were taught on the day on which it was taught, we will lose 50% of the information in just seven days. With review, we will retain about 83% of the information over seven days. Review your course material often!
Organization and Time Management

It’s very important to begin applying good study habits the first day of classes. Don’t wait until the second week or until October; that’s too late if your personal goals include doing well academically.

Developing good organizational skills and time management practices are very important and are great skills that will serve you well in your professional career and in your personal life.

Semester Calendar: Long-term Reminders
Use a monthly academic calendar, like the Student Planner that you will receive when you check into your dorm, to indicate due dates for projects, papers, exam dates and other long-term reminders. See Attachments 2 and 3 for examples of a Semester Calendar and a more inclusive list of the things you’ll want to record on that calendar.

Seven-Day Fixed Schedule: Daily Routines
Develop a seven-day fixed schedule that will not change from week to week. This schedule should include all of your everyday routines, such as the times you will attend classes, athletic practices, club meetings, meals, sleep, exercise (if you’re not on an athletic team) and time to connect with your mentor/mentee. See Attachment 4 for an example of a Fixed Schedule grid.

To-Do Lists: Short-term Tasks
Create to-do lists for day-to-day, short-term tasks that you want to accomplish. These lists will help you stay focused and keep you on track throughout the semester. See Attachments 5 and 6 for an example of a weekly to-do list sheet and tips on creating a to-do list.

See Attachment 7 for details on time management practices.
Textbook Reading

Textbook reading is not like any other type of reading that you have done before. When properly approached, reading a textbook becomes a very active process. Most people do not see reading as an activity that requires more than looking at words on the page and hoping that they make sense.

Non-Technical Textbooks

When reading a novel, or a good history text or humanities text, the task of reading is approached basically as “listening to the author.”

If the novel is really good, the reader may experience the story almost like a movie with sights, sounds, feelings and smells.

With a good history or humanities text, often the style of writing is like having a conversation with the writer. Interesting bits are often sprinkled among the writing to make the theoretical points more interesting or to illustrate the point being made. Being able to paraphrase what the author has written, and including the important characteristics of the theory/study/event, will often be the response necessary to pass the examinations. In some cases, understanding the similarities and differences well enough to answer multiple choice exams, where the knowledge is applied, rather than recognized (a harder and seemingly trickier task) means that the material can’t just be read the day before the exam, but has to be understood well enough to write the response to the exam, including the relevant characteristics of each topic and how they’re different or similar.

Technical Textbooks

When reading a technical textbook, a different approach to the reading task must be used. Only on rare occasions will a technical textbook have interesting stories to tell and can be read in the same manner as the humanities text. And even then, the interesting reading usually has nothing to do with how the reader will be expected to apply the information during an exam. So how do you read a technical textbook and get the information that you need?

1) Change your idea about what reading is. This is an active process. You must actively look for information and explanations. You must recall all of the information that you have on the topic. When you don’t have any background on the topic at all, then you will have to ask whether the material makes sense based on what you know about other subjects.

2) If you have previewed in the past, you probably looked at the bold print and the italics and the pictures, charts and graphs, and figured it was a waste of time, because you didn’t see anything that you understood, so why bother previewing. Let’s change how you preview so that it becomes a tool, to get you ready to listen to the lecture on the material and to learn from the textbook.
Previewing the Textbook Actively

If there is an introduction, read the introduction to the chapter to learn what the author’s purpose is in writing the chapter. What are you to learn about? What type of problems might you have to solve? What new theories, concepts, ideas will be introduced and explained? This is the last complete reading you will do during the preview until you come to the end of the chapter.

a) When you look at the topic headings, ask yourself what you already know about the topic. Have you ever heard of it before? If you have, what do you know? If not, what do you think it might be about? What do you want the author/professor to tell you about this topic?

b) When you look at the bold print or italics in the text, is it new vocabulary or the statement of a theorem, or explanation of a term or definition? What do you already know about it? If you know something about it, bring that information into your working memory, or go back and look it up in the text from the other course in which you learned it. Question whether it will be used the same way in this course, or have a new function/definition. If you have never heard of it, then note the term/definition/theorem as something that you will want to listen for in lecture, especially how the professor uses it. If you plan to read the chapter before the lecture, then note that you will be actively looking for the explanation when you return to read that section.

c) When you look at a chart (or table), go over the information in the chart. What is the chart telling you? Why did the chart organize the information in it the way that it did? Does the organization make sense to you? Will it be information that you will need later to solve problems? Note whether the professor refers to the chart during lecture. Does he address it directly or just use information from it in his example problems? Often, charts or tables have information that the professor uses for test questions, that the student swears was never covered or addressed in class. (An easy example is a table of common weak acids and bases that lists the common name, scientific name and the chemical formula. The related test question asks you to write the formula for the given substances listed by common name.)

d) When you look at the graphs in the textbook, look first to see if you can understand the graph mathematically. All graphs are some type of mathematical representation, and even if you don’t know exactly the quantities being represented, you should be able to explain the graphed relationship as if it were a graph in a calculus class. Next, look at the descriptions of the axis and read the written description under/next to the graph. Note whether the professor uses the graph in lecture or talks about the axis labeled quantities. What is it you hope the text will explain about the graph so that you can understand it in context of the new material and can reproduce a similar graph during an exam or for homework?

e) When you look at the diagrams/pictures used in the text, what does the diagram/picture tell you? Can you understand it without reading the text? Have you seen similar diagrams/pictures in other texts? Will that help you in this one? Does the professor use the diagram/picture in lecture?

f) Are there example problems in the text? Do you understand the mathematics used in the problem? Is the professor going over the same example problem in lecture or one similar to the ones in the text? During the
preview, don’t try to work out the problem, but do know what type of problem is being asked. You want the text to explain what you need to know to do the problem on your own.

g) Now that you have read the introduction, looked at the section topics, the bold print, italics, formulas, charts, diagrams, tables, graphs and example problems, you may be lucky enough to have a text that has a **chapter summary**. If there is a summary, you should read it at this time. This will be the first exposure to the concepts presented in the chapter, in their condensed form. How much do you understand from the information that you learned while you previewed the text? Is any of it similar to what you have learned in another class? What is still very unfamiliar to you that you will need to learn more about so that you can understand the summary when you have gone back to really read the chapter? **What do you want the professor to explain in lecture?** *This will focus your listening, so that you will take better notes and have a reason for listening to the lecture.*

**Reading the Textbook Actively**

Now that you have done the preview, you are ready to finally read the textbook. The reading of the textbook can occur before or after the lecture. With the active preview, this means that this is your second exposure to the material being presented, and your third, if you are reading it after the lecture. Material that is somewhat familiar is easier to learn than material to which you’re exposed for the first time.

Now is the time to start answering all of the questions that you had during the preview, and expanding on the answers the professor gave you over the previewed material, provided you’re reading after the lecture. (Your intent should be to understand the material so that you can apply the knowledge to real world situations that do not follow a textbook format.)

Reading the textbook is now an active process. In other words, as you read the textbook, you pose questions and seek the answers to your questions from the textbook. You should not leave a section until you have all your questions about the section answered.

Read the introduction again and note what you are to learn and what you should be able to do by the end of the chapter.

Now as you get to each section, don’t plan on reading the whole section at once. Read one paragraph at a time. Stop at the end of the paragraph and ask what you learned from that section:

**Did it help you understand the topic of the section?**
**What are you to do with the information that you just read?**
**What questions do you still have about the topic and what do you want the next paragraph to tell you or explain to you?**
**How does what you just read tie into what you read before?**

If you do this actively, you will never again have to feel that you wasted 2 or 3
hours “reading” because you didn’t remember a single word that you’d read. You will be checking yourself after every paragraph, monitoring your understanding and working with the textbook to increase your understanding. The most time you could waste is 20 minutes.

Now, you’ve been reading along and those charts/figures/diagrams/pictures come along. Go over them again in the context of the book. How much more do you understand about them? Do you see why the information was presented that way? How could you be tested about this information?

Next, you come across an example problem in the text. You’ve already checked out the math, (and if you can’t do the required operations, hopefully you have gotten out your math textbooks and brushed up on the mechanics).

1) Cover up the solution and see if you can work out the example, based on the information that the textbook has just given you.

2) If you get stuck, or don’t know what to do, then look at the solution. It is very important that you do not practice the wrong way to do new material. (If you need help, seek out a student who knows how to work the problem and who can explain how to solve it. Don’t waste your precious time struggling or becoming frustrated; ask for help!)

3) After you do a step, check to see if you did it correctly. If not correct what you did. Same reason as in 2.

4) Working out the problem with the textbook is a much more active process then just reading over the example. Of course it makes sense just looking at it, but when you try to work it out, you find out what the author assumes that you already know, what substitutions or identities that you can substitute, or rules that you should be following, that might have been taught in another class. You can make notes to yourself, either on the sheet that you are working out the problem on or in your textbook. These notes will be helpful during your review for an exam.

5) Ask yourself if the example problem illustrates the information/concept/theorem/ technique being discussed. How could the text have done a better job? Did/will the professor explain this type of problem during lecture? What did he/she say differently about the example that helped you understand what was being illustrated?

Continue through the text, paragraph-by-paragraph, example-by-example, until you get to the summary. Read the summary again. Do you understand it better now? What parts do you need to go back and fine tune?

Now go back, and do the problems that you have for homework. Be sure and review your notes the day that you take them and then again over the weekend (lecture and reading). Now you have previewed, read, attended lecture, reviewed notes, done homework (5 exposures to the material). Now if you correct homework, review notes and example problems again, you will be getting ready for your next exam with a fairly solid knowledge base that you will need to fine tune, rather then a knowledge base that can barely support you.
Technical Problem-Solving

A good way to start solving a technical problem, if you are stuck, is to copy the problem out of the book, on to your paper.

To begin solving a problem, **identify the givens** in the problem, i.e. the initial information you have been given to solve the problem. List the givens in a column or some such way to separate them from the rest of the word problem.

**Draw a picture** of the problem, if possible, and label the parts of the sketch with the information that you are given. A picture can help you to decide what to do next.

Second, **identify the unknown(s)** that you are asked to find.

What are the **units** of the unknown? Can you do a unit **analysis of the givens** to know what you have to do with them to solve for the unknown?

Do you have enough information to simply plug the information into a **formula** and solve? Have you made a formula sheet to help you with this step?

Do you need to perform an **intermediate step**, using the information given, to supply the missing information that you need? (Often times enough information is given to solve a problem, if you do two or three steps to find what appears to be information left out in the initial problem, or an appropriate identity substitution supplies what appears to be missing information.)

Make **notes** on your solution paper to follow your **thought process**, such as why you did a particular step, why you chose one formula over another, why you substituted or used a particular identity. This small amount of time makes the homework sheet a valuable study guide when preparing for exams.

Math/science homework can become a **study guide** by putting margin notes when you use a substitution, identity, or shortcut. By verbally identifying why you did what you did, you remove the mystery that you might have when you look at the problem weeks or months later while studying for the midterm/final.

Finally, make sure the answer makes sense. Have you used the correct units and answered the question stated in the problem?
Getting Help Outside of Class

Professors’ Office Hours
On the first day of class, your professor should provide you with information about when she/he has office hours outside of class time. The professor should explain to you how to effectively use these office hours. Most professors are willing to spend time during office hours to explain concepts or to work problems with you to help you understand the material.

Teaching Assistants
Most courses with large enrollments have Graduate Teaching Assistants (TA’s) assigned to help the professors oversee the labs, run problem-solving sessions, and grade exams and lab reports. Most TA’s will also have office hours when you can see them for individual help.

Supplemental Instructors
Many first-year courses have Supplemental Instructors (SI’s). Introduction to Engineering Analysis, Chemistry Principles for Engineers, and Calculus all have SI’s. These are specially trained graduate students who attend the course lectures with you and help you to understand the most important points of the lecture, what information is likely to be on an exam, and the important concepts that you should have learned from reading your course textbook. If your course has a Supplemental Instructor session, take advantage of this opportunity and attend the sessions! Why? **Students who’ve attended these sessions have earned a full grade point higher than their classmates who didn’t attend these sessions!!!**

FREE Tutoring
In courses that do not offer Supplemental Instructors, you may go to the Tutoring Center and obtain information about their tutorial services. Tutors are paid undergraduate and graduate students who have taken and done well in the course that you’re taking. All tutors are screened by the Advising and Learning Assistance Center. For more information about tutorial services, go to http://www.rpi.edu/dept/advising/ and click on “Tutoring Services”. If you’re struggling with the course material in week one, you should immediately request tutoring services.

Upper Class Students
Be sure to make some friends with upper class students who have already taken the courses you’re taking. They can help you with homework, give you tips on how to maximize your time in the course, offer advice on how to form study groups, and point out the “bigger picture” for a particular course.
Attachment 1

How to Make a Crib Sheet

FIRST:
♦ Go over the lecture notes and the textbook.
♦ Identify the formulas used as a part of homework problems and lecture notes.
♦ Figure out the essentials that must be written down.

SECOND:
♦ Organize. Try to use the space permitted carefully so that you can fit as much as you need.
♦ Divide the crib sheet into different sections, each corresponding to a different chapter in the textbook. Write neatly and legibly. This would save you a lot of time during a test. Use different colors.
♦ If you still have space, write some sample problems/questions from the homework that you think are important.
♦ Show your crib sheet to your friends and ask them to look it over to see if you have missed anything important.

THIRD:
♦ Study your crib sheet. Know the exact location of everything on your crib sheet.
♦ Do not lose or forget your crib sheet at home.
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**Attachment 2**

**Semester Calendar**
Attachment 3

Semester Calendar List

You may want to color code so that you can tell at a glance which subject has something due, without being close enough to read the calendar. For example, blue=physics; orange=management; cool green=H&SS; yellow=math; puke green=least favorite subject.

Put the following information on your Semester Calendars:

1. Days of the months continuously without a break from tonight until the last day of finals. Include holidays/vacations/class cancellation days.

2. Due dates (from syllabi) of the following
   a. homework
   b. papers
   c. projects
   d. lab reports
   e. presentations
   f. group activities

3. Exam dates and/or quiz dates
   a. if listed on the syllabus
   b. or as soon as the professor gives you the date in class

4. Other important dates, such as
   a. Mentor Program activities
   b. fraternity/sorority functions
   c. ski trips
   d. athletic competitions
   e. dates with significant other
   f. family in town (expect you to spend time w/ them rather than study)
   g. other non-study times that are not on the fixed schedule

5. Other important events that you’ll have to plan around in order to get your studies done in a timely fashion

POST YOUR SEMESTER CALENDAR IN A LOCATION WHERE YOU CAN SEE YOUR ENTIRE SEMESTER EASILY AND EVERYDAY. THIS WILL HELP YOU TO PLAN YOUR TO-DO LIST.
# Attachment 4

## Fixed Schedule

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Attachment 5

To Do List

Monday

Tuesday

Wednesday

Thursday

Friday

Saturday

Sunday
Creating To-Do Lists

Things that belong on your To-Do list are things you want to accomplish in the short-term, i.e. during the day or during the week.

1. Put everything you want to accomplish on one list.

2. Don’t list routine tasks, like brushing your teeth or sleeping.

3. Do put large tasks on the list, even if you can’t complete them entirely in one day. For example, “work on paper for H&SS class”.

4. Set priorities
   a. Write down important things first on the list, or use letters or numbers to set the order of their importance
   b. Determine what are your top priorities are by asking yourself:
      i. Does the task have a deadline?
      ii. Will it affect my course grade?
      iii. Does it take me closer to achieving my planned goals?

5. Cross-off or check-off completed tasks

6. Select one day of your week to make up your weekly to-do list for the next week. Thursdays seem so be a good day, since you rarely receive new class assignments on Fridays. Any tasks from the previous week that were not completed should be added to your new to-do list.
Practicing Time Management

It is important that when you build your time management plan that you are realistic about how and when you function best.

**Know when you are alert.** It does no good to schedule studying when your body is demanding that you rest. Everyone has a time of day when they are very efficient and other times of the day when everything takes twice the time to get done. You want to study at your efficient time and play at your slow time.

**Be Realistic** when you plan time for studies. Know how long your average problem/paper takes to get done. Plan a few extra minutes for things to go wrong. Add another bit of time for goofing off. Now you might have a realistic amount of time to get the work done.

**Learn to break big tasks into small tasks and to plan backward from the due date.** How many small parts can the large project/paper/presentation be broken into? Can you get started on any today? Look at the due date. Go backwards from there to today and schedule doing a small task each day/week until the task is done. You want to plan on having it done at least 3 days before it is due. That gives time for crisis and emergencies and computer crashes.

**Plan at least 2 hours of study for every credit hour** you are taking. For example, 19 credits will require 38 study hours. Early on, you may have an easy course that doesn’t require much time to do the readings or homework. Use your extra study time to solidly learn the material that will lay the foundation for your Junior and Senior level courses. For example, use the study time to think about how you can apply the concepts to the real world. Make up your own exam questions over the lecture material, do extra problems, etc.

**Plan time for yourself.** If you are going to a movie, on a date, off-campus for a meal, to play an intramural sport, plan for it so that you can do it guilt-free. Consciously plan free time and study time so that life doesn’t “just happen,” rather you are in control of your time.