# Study Skills for Graduate School and Beyond



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Study Skills for Graduate School and Beyond Eric G. Moss and Jennifer Fischer Copyright 2019

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Jennifer Fischer, PhD Vice-Chair for Education Department of Molecular Biology School of Osteopathic Medicine Rowan University Stratford, NJ Graduate school is a challenge. Many students will do well, and some won't. The question is *Why*?

We have advised many graduate and medical students. When talking with them about study skills, we have learned that several factors make a difference.

In this booklet, we address these issues:

- I. Time Management and Organization
- 2. Learning the Material
- 3. Test-Taking
- 4. Mental and Physical Health

The most important skill to have in graduate school is time management. This skill can be considered in four ways:

- Keeping up
- Basic tools: Calendar, weekly plan, and task list
- Weekly strategy: Prepare, Attend, Review, Reinforce
- Study sessions and self-discipline
- Keeping up

Each course will present a lot of new material *every week*. Many students who did well in high school and college have difficulty adjusting to graduate school or medical school. At this level, it is nearly impossible to catch up once you've fallen behind.

### Last-minute studying won't work anymore.

The material comes too fast. The subjects are complex, and there are many more details to learn. Most courses start easy and get harder, and the later material builds on earlier topics. Some courses have only three exams, meaning a third of the course may be covered in a single exam. You may also have two or more exams within a few days of each other. Long-term memory requires consistent, methodical repetition, which is what you need to do well on exams all semester.

### Learn all of each week's material in the same week.

Study every day. It's okay to miss a day or so. But if you let too many days go by without working on the material, your learning will be less efficient, and you will greatly increase your workload. If you skip days, you risk getting overwhelmed later.

### Repetition is the key to learning.

You must see the same material *many times* before the exam. Only through repetition can you remember all the details well enough to get a good grade. *Within a single week, you must review the same material repeatedly in several, spaced intervals.* 

### Studying better saves time.

Although it's not unreasonable to spend 6-8 hours a day studying in graduate school, once you know how to learn effectively and efficiently, you can get more done in a limited amount of time.

## 1. Time Management and Organization

### • Basic tools: Calendar, weekly schedule, and task list

A common habit of all successful people is a certain amount of organization and planning. You can't know what's coming up and stay on track without organization. Good organization keeps you from becoming overwhelmed, allows for unexpected events, and makes time for leisure.

# Keep a calendar of classes, exams, assignments, and your own personal events.

When you get your syllabuses, copy each exam date and assignment due date into a calendar. Also put weddings, trips, and any other major event that will take you away from your studies for a day or more. And once you make the calendar, use it: check it at least once a week so you don't miss anything.

By seeing that some exams occur within days of each other, you will recognize the need to study well before that week so you can be focused and effective the week of the exams.

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The calendar of someone taking three courses in a fall semester.

### 1. Time Management and Organization

#### Make a weekly study schedule.

Studying is now your job. Make a weekly schedule of when you will commit to studying. A weekly schedule is different from a calendar: Your schedule is your promise to yourself to show up to study at specific times.

Set realistic goals based on when you get up, eat, go out, exercise, and go to bed. Include everything you do regularly on your schedule. Be honest with yourself: Which blocks of uninterrupted time will you devote to focused work? Start by planning for a minimum of 6-8 hours of study time each day. Some people will need more study time to do well.

#### Adjust your schedule as needed, then stick to it.

You may discover that one course requires a lot more reading, more memorization, or more practice problems. Don't sacrifice one course for another; instead, adjust your schedule to make the extra study time you need. You may decide to exercise at a new time, or that you want to hang out on Saturdays. No problem, just rewrite your schedule. If it works, keep at it. If it doesn't, change it.



A weekly schedule for someone who works some days and takes two courses.



A weekly schedule for someone who is at home during the day and takes three courses.

### 1. Time Management and Organization

#### Make a task list.

A task list serves two purposes. First, writing the list makes you spend a few minutes planning, seeing the work just ahead, and staying in control.

At the start of your study week, think about what materials you will have for each class: a textbook chapter, lecture slides, audio recordings, plus your own notes and study aids. Give some thought to how you want to approach going through these.

A task may be *Cell Bio – Chapt 12* or *Biochem – Lecture 8*. It could also be *Immuno – make a table of differences between B cells and T cells* or *Pharm – make questions for study group*.

Each task should be what you could accomplish in a study session. That way, when you sit down to study — according to your weekly schedule — you should get done one or more tasks on your list.

#### Check off each task when it's done. Note the time each task took.

The second purpose of a task list is to give you a sense of accomplishment: It feels good to check off items, especially the last item. Sometimes you decide that once was not enough for a particular task, and you should repeat that task until you get it.

Write down how much time each task took to complete. Get a sense of how much time you need for each. If you don't get everything done, then you have learned that you need to adjust your weekly schedule: Give certain tasks more time, or carve more time out of your week for studying.



A weekly task list for someone taking three courses.

• Weekly strategy: Prepare, Attend, Review, Reinforce

Memory has two phases: short-term and long-term. The goal of studying is to convert short-term into long-term memory. Long-term memory is achieved by *repetition*.

# Rehearse all the material repeatedly until you can recall it correctly and completely.

You will need a systematic approach to learn all the new material each week. Try this way, which we call *PARR for the Course* :

Prepare	preview the material before class go through the book chapter and lecture slides start taking notes, formulate questions		
Attend	go to class and be attentive stay engaged, ask your questions take notes where needed, don't write everything		
Review	do a slow review, read everything think through concepts and learn details put together your own study aids		
Reinforce	do a faster review of previous material revise and condense your study aids practice cold recall, could you teach the material?		

Plan your weekly studying so you can accomplish all four PARR steps each week for each course. At a minimum, each step needs 3 hours of work for a 3-credit class. It is not unreasonable for the Prepare, Review, and Reinforce steps to take 6 hours each.

# In addition to learning new material each week, refresh the material from previous weeks.

Set aside time each week to reinforce all the previous week's material. Some courses have exams every three, four, or even five weeks, so there will be a lot of material to carry forward each week.

Some courses have weekly assignments or problem sets. Do these as part of *Review*, but also as part of *Reinforce*: Look over completed assignments and re-do problems. Find new problems to do in the book, if you can. That is part of *reinforcing* the material.

We call this method *PARR for the Course* for two reasons: First, the name helps us to remember each step. Second, the name also reminds us that par for a course (in golf) is good, but may not be enough to win. A student might accomplish the four PARR steps every week, but that may not be enough to get all As.

### • Study sessions and self-discipline

Scheduling your study times is only part of the organization game. You must also have a way of working once you sit down to study. This is the popular "pomodoro" method:

- Take out your study materials and task list.
- Study uninterrupted for about 25 minutes (set a timer, if you like).
- When the timer goes off, mark down that you completed a session.
- Take a short, 2-5 minute break (set a timer for these, too).
- Get back to work for another 25 minutes.
- After 4 sessions, take a longer break of 15 to 30 minutes.

You may vary this method by working in longer intervals of 30-45 minutes. You may also work until a specific task is complete, say reaching the end of a chapter, lecture, or assignment. Regardless of how you choose to study, find your flow: start work, study uninterrupted, take a break, then get back to work.

This method works because, during the breaks, your memory consolidates what you've learned. You also discover how long a specific task takes to finish so you can get better at estimating the time you need. By marking down completed sessions and crossing items off your list, you get a sense of your progress.

Some classes have weekly assignments or problems. In early study sessions, you will complete the assignments and solve the problems. In later study sessions, you may repeat those assignments and re-do the problems. You are training your memory on *how* to solve the problems.

# Hard work should come with rewards. Take breaks, treat yourself, then get back to work.

These are the fundamental skills of accomplished students:

- Setting task goals in advance.
- Staying on schedule to achieve weekly goals.
- Getting started and getting back to work after a break.
- Managing distractions.

Reward yourself for achieving your goals, but also develop the self-discipline to get your work done when there are more appealing alternatives. Your generation has more distractions available than any previous generation. Use your time in this program to raise your student skills to the next level.

Learning is a complex mental activity. What worked for you previously might not work in graduate school and beyond. Here are approaches to learning that might help you become more efficient and effective:

- Learning in layers: How to read a textbook chapter
- Study aids
- Reviewing and recalling
- Working with others

### • Learning in layers: How to read a textbook chapter

Reading assignments for a single class may be 25 to 50 pages per week, and sometimes more. Almost no one can read from the first word to the last and remember everything. *Don't try to learn all the details from the start*. Start with the big picture, approach the material systematically, and accumulate details each time through.

# Learn new material in layers: get an overview first, and then fill in more detail each time you review until you have it all.

This approach can work with any study materials but works particularly well with textbooks. Here's how to read a textbook chapter:

- Preview
- Study in portions
- Learn in layers
- Read actively
- Review and recall

#### Preview:

Start by skimming the chapter: Read all section titles and headings. Look at the figures and read their titles. Say out loud the words in bold, italics, or color. Some textbooks have section or chapter summaries; read those even if you don't know what everything means. Once you've finished the preview, try writing an outline from memory, but look back to get things right.

# Preview the reading before you go to the lecture, so in class, you will be seeing it for the second time.

At a minimum, you should preview the textbook material *before* the lecture. You should really learn as much as you can before the class. Then, when you are listening to the professor, you are getting the material for the *second* time. You may then catch what the professor added or what is different.

### 2. Learning the Material

#### Divide each week's material into portions.

#### Study in portions:

A whole textbook chapter is usually too much to take in all at once. After you have previewed the chapter, decide how to divide it up into 2 or more portions based on topics. Some people can handle long portions, like 2 or 3 per chapter, others need smaller chunks, like 5 or 6 per chapter. Learn what works for you. It's a good idea to write down where each portion starts and ends, and check them off as you go through them.

#### Learn in layers:

Go through each portion in more depth, but *don't start reading every word yet*. Read the section titles and headings again. Depending on how the textbook authors write, it may be effective to read the first and last paragraph of each section. Or you may try reading the first and last sentence of each paragraph. Look at each figure and all of its parts.

#### Read actively:

Once you have laid down layers, then read that portion of the chapter from start to finish. Reading actively means asking yourself questions as you read and then looking for the answers. Try thinking of questions that might be on an exam. If something doesn't make sense to you, formulate a question to take to class.

# Don't be a passive reader. Engage with the material. Pose questions. Take notes. Think about how you want to organize your study aids.

#### Review and recall

After completely reading each portion of the chapter, test yourself immediately by free recall: Try to write down (or draw) everything you can remember on a blank page. Look back to see what you missed. Note what you miss, either on a separate paper, in the book margin, or on a post-it.

#### Problem-solving:

Courses that involve problem-solving and math require a different kind of studying. First, you learn *how* the problems are solved: what information matters, what assumptions to make, what method to use, and what calculations need to be performed. Then, *get practice solving many problems*. Don't limit yourself to just the problems in the homework assignments. Find additional problems to solve. Often additional problems are at the end of the chapter or in the back of the book. Look at the answers only after you finish. Try making up your own variations on the originals.

#### Practice problem solving with as many examples as you can find.

• Study aids

Study aids are what you create to *organize, combine, and condense* the material as you learn. Here are examples:

- Outlines
- Tables
- Lists
- Flashcards (paper or electronic)
- Flow charts
- Drawings and diagrams
- Labels for pictures and structures

# When making study aids, organize the material yourself, don't just copy it word for word.

By creating your study aids, you reformat and summarize the material *yourself*. The act of creating a study aid makes you think through related facts, engages your brain in multiple ways, and strengthens long-term memory.

Make study aids that *organize* the material. The card on the left below shows a list of epithelia of the GI tract as it was presented in class. The card on the right shows an organized table, including images, and more material from the lectures. The slide on the right was not presented in class, but it was made by a student as a study aid. It *combines and condenses* relevant information in one place.



There are many different ways to reorganize the material in study aids. As long as you can incorporate all the details without missing anything, then do what works for you.

# When making study aids, be careful not to leave anything out. Combine and condense the material, but don't over-simplify it.

You may selectively leave out what you already know well. For example, once you know that B cells and T cells are related and have certain similarities, your study aid may focus on their differences. When revising and updating your study aids, condense the material, but *include all details that you haven't already learned well*.

• Reviewing and recalling

# To succeed in graduate school, you must know the details and be able to see them in new contexts.

Higher education is structured so that students advance in their knowledge and competency as they go:

- Concepts and direct recall of facts (undergraduate)
- Working knowledge and integration (graduate school)
- Problem solving and fact finding (graduate and professional school)
- Planning and decision making (professional school and beyond)

Having working knowledge means you can recall facts without prompts and cues and spot where they apply in new contexts. It is not enough to be familiar with the concepts; you must be able to recall the details. You must understand how concepts are connected and how the details fit in. A skilled student knows how to learn these things effectively.

# Learn the details and how they are related. That's what the professors expect you to know.

Each professor uses the textbooks, lecture slides, and other materials in different ways. *Pay attention to how they tell you to learn their material*. However, every one of them expects you to learn everything they are teaching. On a test, they will not "emphasize" one topic over another. If it is in the materials, you must know it.

Your professors write all of their own exam questions. They are experts in their subject areas and teach both graduate students and medical students. They don't use test banks from the book publishers or any other sources. So, when they come up with the wrong answers (the "distractors") on the tests, they know what kinds of guesses students who don't know the material will likely make.

#### A knowledge scaffold:

Learning in layers helps you to achieve an understanding of concepts that is sufficiently strong that it supports lots of details. You are slowly building a "knowledge scaffold." Many students bemoan a poor exam grade by exclaiming *But I understood the concepts!* That's just the scaffold. It is not enough to understand concepts to get a good grade in graduate school. Your study skills must enable you to integrate lots of details as you go. In order to build a strong knowledge scaffold that supports many details, you should:

#### Preview first, study in portions, learn in layers, create organized study aids.

The more details you integrate into your knowledge scaffold, the stronger it becomes and the more new details it can support.

### 2. Learning the Material

#### Align your weekly study schedule with your learning strategy:

#### Prepare well:

At a minimum, preview the chapter and slides before class. If it benefits you, read through the chapter thoroughly before going to class (as described above).

#### Review in intervals:

You should review everything several times: immediately after class, a day or two later, each week, and before the exam. Keep notes on what you missed. Try to have fewer gaps and mistakes each time.

#### Slow reviews:

A slow review is the most in-depth studying you will do. Do it a day or two after you attend the lecture: Go through everything in portions and in layers. See if the slides and the book don't agree. Make your study aids that organize, combine, and condense the material. Note where you need clarification, and ask at the next class.

#### Faster reviews:

Do a faster review each week. Use your study aids, but if needed, go back to the original slides and the textbook. What don't you remember? What don't you understand? Use and modify your study aids week to week. The week of the exam, there should be very little left for you to learn. The faster review is also time to integrate what you know. Some exam questions will ask you to connect facts from far apart in different lectures. See how topics connect.

#### Reinforce – Practice cold recall:

Test yourself frequently as you go: take out a blank page and see how much you can recall. Make up your own exam questions to answer later.

#### Reinforce – Teach it:

For each topic, try to teach it: Could you explain the ideas? Can you include all the facts and details? Use a blank piece of paper or a whiteboard to teach it to a classmate, a family member, an imaginary student, or a pet. As professors, we often find gaps in our own knowledge and understanding when we need to teach something new.

# Imagine that you will have to teach the material to someone else. How well would you do?

### • Working with others

#### Your professors:

Class time is your best opportunity to get the professor's take on the material. The professors really prepare for each class. They want you to be there and to be engaged. They appreciate questions. Your *active listening* — even if you are only thinking to yourself and taking notes — engages your brain and helps you remember the material.

### Go to every class you can. Stay engaged. Ask questions.

An audio recording should be made of each lecture (the Echo). But sometimes technical glitches happen: microphones are too low, batteries die, audio files are corrupted. So your best bet is to come to class.

For clarification about the material, it is best to ask the professor, especially *before, during, or after class.* Come prepared with questions. Email or office hours can be useful for longer explanations or more complex problems. Our faculty are happy to help an engaged student.

For courses that use a textbook, reading and using the book effectively is like having another instructor for the course. The book's authors and editors have done a professional job explaining and illustrating the material. Don't just use it as a back-up. Allow enough study time to use the book as it was intended: to teach you the material.

#### Don't neglect the textbook; use it as if it were another lecturer in the course.

#### Your classmates:

Learning is achieved by reviewing and recalling the material in different ways. Studying in pairs or small groups is a great way to mix things up and reinforce what you've learned. But go through the material on your own first (*Prepare* and *Slow review*). During your slow review, come up with sample questions for yourself and others to answer. If you get together with a study group, test each other, and try teaching the material. Have the others find anything you missed.

#### The Instructor, the Course Director, and the Program Director:

If you are not doing well and don't know what's wrong, make an appointment with the professor who lectured on the material, the Course Director (the professor in charge of the course), or the Program Director, especially if you are not doing well in more than one course. It is always better to start a conversation about your progress early. There are several options available if you are struggling. We all want you to succeed and are really here to help.

### If you are not doing well, reach out and seek guidance.

All the hard work is done during the weeks before the exam. There are only a few things to say about test-taking itself:

- Test anxiety
- Managing time
- Common errors
- Using the feedback
- Test anxiety

Everyone's physiology changes under pressure. A musician might have stage fright immediately before stepping in front of an audience, but once they start to play, the anxiety subsides. Why? Because they practiced well. A lot of test anxiety can come from inadequate preparation.

# If you have rehearsed the material well, your anxiety level will drop once the exam is underway.

#### If you feel anxious before the exam:

About an hour or so before, sit alone and write down what is preoccupying you: your concerns about the test, the course, school, or anything else. This practice has been shown to improve the exam performance of students with pre-exam anxiety.

### If you feel anxious during the exam:

Practice calming yourself.

Breathe. Relax your muscles. Sip water.

- Focus on the task at hand.

You are here to answer questions, so continue to do that.

- Read each question to yourself. Pick your answer. Then move on.
- Remember: No single test has irreversible consequences.
- Managing time

In most classes, you should have about 2 minutes, on average, to answer each multiplechoice question. Try to answer the questions in order. Skipping around a lot may increase confusion and anxiety. If you spend too much time on one question, flag it (which you can do within the electronic exam), move to the next question, and come back to it later. Be sure to get to all the questions once, then circle back around.

### • Common errors

The most common mistake is to misread the question. Read it all the way through before looking at the answers. Sound out the question (quietly), word by word. Think of your answer before looking at the choices. If your answer isn't there, read the question carefully again.

# Read the exam questions carefully and completely. Read them quietly aloud, if that helps.

A second common mistake is to get tripped up by a negative or "inverted" question, like, "Which of the following is false...." Take your time to understand each question.

 Q: Which of the following statements about cancer progression is FALSE? (from "Tissue maintenance and renewal" lecture)
\* A: because cancer mutations are essentially random, the order in which genes are activated or inactivated has no effect on the progress of a developing tumor B: because cancer mutations are essentially random, many more mutations occur than are important to the developing tumor C: the development of each cancer of a single type is characterized by its own collection of genetic changes
D: despite the fact that cancer mutations are random, certain types of cancers are characterized by specific changes in a specific order

> An example of an "inverted" multiple-choice question. The right answer is A, which is the only <u>false</u> statement.

Many online videos and other questionable advice sources teach tricks for getting questions right when you don't know the answer. *These don't work here*. Our professors write their exams themselves. They know the material well and write the answers so that you can get the questions right only if *you* know the material well.

#### Remember: There is no substitute for knowing the material.

• Using the feedback

Quizzes and exams give you feedback on your learning. If you do much worse than you expected on a quiz or exam, go to the professor to see the questions and answers and try to learn what mistakes you made. Did you make common test-taking errors, or did you not prepare well enough?

When advice is crowd-sourced on how to shake the temporary depression and anxiety surrounding school, one of the most consistent pieces of advice given by people who have gone through it and overcome it is to be sure that you are sleeping well, exercising, and maintaining a healthy diet.

# Your mental capacity to focus, remember, learn, and keep a healthy outlook depends on you taking good care of yourself.

Here are the key issues:

- Sleep
- Diet and exercise
- Stress and anxiety
- Life circumstances
- A healthy outlook
- Sleep

Most adults need 8 hours of undisturbed sleep each night for optimal mental performance. Even one night of disturbed sleep can throw off days of mental effort. Cut back on habits that interfere with sound sleep (alcohol, caffeine, late meals, bright lights, screens, sugar, chocolate). Do things that encourage good sleep (exercise, read for pleasure before bed).

#### • Diet and exercise

Diet:

Add more of the obvious components of a good diet (water, fruits, and vegetables). Take in less of the obvious components of a bad diet (restaurant food, carbs).

#### Exercise:

Do what you like. Set aside the time. Put it on your weekly schedule. Stay consistent. It will help you sleep better and improve your mental focus.

### • Stress and anxiety

What you are doing is hard. Everyone who attempts it experiences some level of stress and anxiety. However, some students will experience a level that is not healthy: it interferes with normal daily activities and short-term goals. That's the sign that assistance is needed.

# Recognize when your mental state is interfering with your life, your health, or your ability to learn.

All graduate students have access to free services through the Student Wellness Program (ubhc.rutgers.edu/swp).

• Life circumstances

You will need a safe, comfortable, and quiet place to learn. Reduce distractions, focus on your courses, and seek supportive people. Being a successful student requires time, attention, and effort. Some difficult circumstances can be changed, others can't.

#### Do what you can. Adapt where you must. Seek help when you should.

• A healthy outlook

A healthy outlook...

- Makes you plan ahead, recognize your weaknesses, proceed with appropriate caution, and prevent problems.
- Allows you to stay focused, be disciplined, and seek help when needed.
- Gives you the confidence that you can achieve your goals.

Habits of a healthy outlook:

- Set and achieve reasonable short-term goals
- Get back on track after a setback
- Practice healthy lifestyle habits
- <sup>-</sup> Adapt to change, accommodate others
- Be thankful, grateful, and generous

#### Steps you can take right now:

- Commit yourself to raising your study skills to the next level.
- Make a list of the things that can get in your way and decide how you will handle them.
- Make a list of things that will help you succeed and decide how to make them happen.
- Get organized. Keep a calendar and maintain a schedule.
- Show up to class with enthusiasm.