

Dear Student:

Welcome to Jefferson Medical College! From November through January of the first year, you will take the course Molecular and Cellular Basis of Medicine (**MCBM**), which contains topics from molecular biology, genetics, cell biology, cell physiology, and biochemistry.

Courses in cell biology, genetics, or biochemistry are not a prerequisite for admission to Jefferson Medical College. MCBM is taught accordingly. However, we recognize that our course presents much more of a challenge to non-science majors than to science majors. Non-science majors often find it challenging to learn the vocabulary and concepts, and to think in a scientific manner. If you are a non-science major and if you feel that you have a weak background in molecular biology and cell biology, we would like to recommend that you use a little bit of your time this summer to read about this material. This should help you get through November more easily.

(Please note that this is not an across-the-board recommendation to study these topics. We make the following suggestions simply in response to students who struggled in the past and told us they wished they had known to study a little bit over the summer.)

Following are comments from two students who finished the course in a previous year: One student wrote: "As a non-science major, just switching from anatomy, which is a fairly "verbal" science to biochem-style reading, diagrams, etc. was very difficult. I felt totally overwhelmed with the initial week's material on DNA, RNA, etc. as I simply felt totally unfamiliar with the "language." ... "As I got more comfortable with reading scientific material, it all became easier, but initially it was very hard. Some optional reading on the DNA/RNA stuff would give us a head-start and also a little exposure to a different style of writing and reading, dealing with diagrams, etc. I liked Lippincott's [*see below*], but anything concise and clear with good diagrams would have been very helpful."

Another student wrote: "My feeling is that students should have at the very least a basic concept of some of these topics from their MCAT preparation, but in the case of the non-science majors or older students removed from these studies for a few years, there is definitely need for some pre-reading." ... "As I understand it, this is not meant to be an all-encompassing introduction but rather a way to get acquainted with the general principles of genetics, biochemistry, and metabolism. The more specific details are what the MCBM course is for! To be concise: I feel that the summer reading ought to stress November's material, as these are the concepts that underlie much of the December and January material. Additionally, students who feel anxious about the latter material after November have vacation time in which to read ahead, and at that point they should be much more comfortable/informed as to what their strengths and weaknesses are (and have the syllabus to boot!)."

Past student liaisons felt that you would benefit the most from being familiar with the following topics:

- DNA, RNA, Proteins (structure, processing, etc.)
- Lab Techniques (PCR, blotting, electrophoresis)
- Patterns of Inheritance
- Membrane Structure
- Cytoskeleton
- Cell compartments
- Cell division
- Cell signaling
- Apoptosis
- Cell cycle
- Aerobic and anaerobic metabolism (basics)
- Membrane transport

If you want to preread, we recommend that you choose one of the following books:

Bruce Alberts et al., Essential Cell Biology, 2nd edition, Garland Science Pub., 2003/4.

Please note that MCBM is focused entirely on humans (but this book is not). This book helps you learn the most basic material. However, it is not detailed enough to be recommended as one of the main reference books during the MCBM course (its larger sibling by the same first author is).

Detailed recommendations for prereading for part 1 (November and part of December) of MCBM:

Chapters 1 and 2, as well as part of chapter 3 are very basic; you probably know the key concepts from your undergraduate education.

Pages 160-165 describe laboratory techniques; this may be very helpful to you (see also chapter 10 below).

The following chapters are very much worth reading. At this stage, don't worry about details. Instead, try to familiarize yourself with the most important principles and with a very rudimentary vocabulary.

Chapter 5: DNA and Chromosome Structure

Chapter 6: DNA Replication and Repair (you can leave out recombination)

Chapter 7: From DNA to Protein

Chapter 8: Control of Gene Expression (you can leave out bacteria; please focus on eukaryotes)

Chapter 10: Manipulating Genes and Cells (you can focus on the laboratory methods that relate to DNA; if you have never dealt with this material before, it is very helpful to read this chapter now)

Chapter 11: Membrane Structure

Chapter 12: Membrane Transport (we will discuss action potentials only in January)

Chapter 15: Intracellular Compartments

Chapter 17: Cytoskeleton (you can concentrate on eukaryotes and leave out muscle contraction)
Chapter 18: Cell Cycle Control and Cell Death
Chapter 19: Cell Division
Chapter 20: Genetics, Meiosis, and the Molecular Basis of Heredity (this is not the greatest chapter, and you may prefer learning this material from another source)
Chapter 21: Tissues and Cancer (we will deal with much of the information in this chapter)

The above will give you at least a very good preview to what we'll try to teach you.

Following is another recommendation, in case you don't like Alberts' book mentioned above.

Berg JM, Tymoczko JL, Stryer L: Biochemistry, 6th edition, WH Freeman and Co., New York, 2006

This edition has a bluish-purple cover. Earlier editions should also work for you. However, I would stay away from the 5th edition, because it is quite disorganized.

This book is aimed at graduate students, and it contains many details that you will never have to know. However, it is a beautifully colored book, and beginning students often like to use it. It will be more useful for you in December and January than in November. In my opinion, its contents are not very well organized. Late chapters in this book are in fact the topic of MCBM lectures in November (i.e., early in MCBM), while material from most of the early chapters will be discussed late in MCBM, i.e., in December and in January.

Detailed recommendations for prereading for part 1 (November and part of December) of MCBM:

You might benefit from trying to extract the most important information from the following chapters:

Chapter 2: Protein Composition and Structure

Chapter 3: Exploring Proteins and Proteomes (please read only about electrophoresis)

Chapter 4: DNA, RNA, and the Flow of Genetic Information (it's worth reading this chapter in its entirety)

Chapter 5: Exploring Genes and Genomes (this chapter has a lot of information about laboratory techniques; reading this chapter will be very useful)

Chapter 8: Enzymes: Basic Concepts and Kinetics (this chapter is presumably way above your level of experience; you might just want to skim it)

Chapter 14: Signal Transduction Pathways (you might benefit from grasping the key concepts; at this point, details are unimportant)

Chapter 28: DNA Replication, Repair, and Recombination (this chapter is a must)

Chapter 29: RNA Synthesis and Processing (this chapter is also a must; however, please only concentrate on the key concepts and omit anything that concerns bacteria)

Chapter 30: Protein Synthesis (please concentrate on the essentials; for our purposes, this chapter contains way too many details)

Chapter 31: The Control of Gene Expression (this chapter is also a must; however, please only concentrate on the key concepts and leave out anything that concerns bacteria)

Probably the most popular book among the students is the following (the students refer to it as 'Lippincott'):

PC Champe, RA Harvey, DR Ferrier, Lippincott's Illustrated Reviews: Biochemistry, 4th edition, Lippincott Williams & Wilkins, Philadelphia, 2007.

Many students like this book for its illustrations. The strong point of this book is metabolism, which we will cover in December and in January. Molecular biology is placed at the end of this text. Overall, this book contains considerably less detail than you will see in our syllabus.

Detailed recommendations for part 1 (November and the first part of December) of MCBM:

I would suggest that you read the following chapters:

Chapter 1: Amino Acids (You can go easy on the topic of pH though.)

Chapter 2: Structure of Proteins

Chapter 3: Globular Proteins (we will discuss most of this only in December)

Chapter 4: Fibrous Proteins

Chapter 5: Enzymes

Chapter 29: DNA Structure and Replication

Chapter 30: RNA Structure, Synthesis and Processing (leave out anything that pertains to prokaryotes)

Chapter 31: Protein Synthesis

Chapter 32: Regulation of Gene Expression (leave out anything that pertains to prokaryotes)

Chapter 33: Biotechnology and Human Disease (this information is very important if you haven't worked in a molecular biology lab).

Please remember that we are not asking you to learn this material before our course starts. We provide the above list only to make your life easier in case you feel that your background in this basic science is not as strong as you might like it to be.

Good luck and take care!

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