

## Critical Thinking in KIN 302, 402, and 414

In each course that I teach, I require more than simple memorization and regurgitation. Simple memorization of presented material will not further your abilities regardless of your chosen career. I expect you to apply the knowledge you gain to novel situations. You will be expected to reasonably provide answers to questions about movement, from both biomechanical and/or anatomical perspectives (the two are not necessarily mutually exclusive). In order to do this successfully, you will need to engage in **critical thinking**.

You may be familiar with the concepts and processes associated with critical thinking. This is a refresher if you are acquainted with critical thinking. If you are not acquainted with critical thinking, then the following will provide some basic information on how to engage in critical thinking. This will be EXTREMELY beneficial to you in my classes.

What is critical thinking?

Critical thinking is essentially skillful and responsible thinking in which a problem is examined from all angles. Based on this insightful examination of the problem, judgment is made to draw some basic conclusions (or provide an answer to a particular question).

Michael Scriven and Richard Paul summarized critical thinking as follows:

“Critical thinking is the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action. Critical thinking can be seen as having two components:

1. a set of skills to process and generate information and beliefs, and
2. the habit, based on intellectual commitment, of using those skills to guide behavior.

“It is thus to be contrasted with:

1. the mere acquisition and retention of information alone, (because it involves a particular way in which information is sought and treated,)
2. the mere possession of a set of skills, (because it involves the continual use of them,) and
3. the mere use of those skills (‘as an exercise’) without the acceptance of their results.”

The Critical Thinking and Information Across the Curriculum faculty defines critical thinking by recognition and implication as follows:

Critical thinking recognizes:

1. patterns and provides a way to use those patterns to solve a problem or answer a question

2. errors in logic, reasoning, or the thought process
3. what is irrelevant or extraneous information
4. preconceptions, bias, values and the way that these affect our thinking
5. that these preconceptions and values mean that any inferences are within a certain context
6. ambiguity – that there may be more than one solution or more than one way to solve a problem

Critical thinking implies:

1. that there is a reason or purpose to the thinking, some problem to be solved or question to be answered
2. analysis, synthesis, and evaluation of information

Critical thinkers:

1. can approach something new in a logical manner
2. look at how others have approached the same question or problem, but know when they need more information
3. use creative and diverse ways to generate a hypothesis, approach a problem, or answer a question
4. can take their critical thinking skills and apply them to everyday life
5. can clarify assumptions and recognize that they have causes and consequences
6. support their opinions with evidence, data, logical reasoning, and statistical measures
7. can look at a problem from multiple angles
8. can not only fit the problem within a larger context, but decide if and where it fits in the larger context
9. are comfortable with ambiguity

My responsibility is to provide you with the background information or the facts as they pertain to each presented topic. Your responsibility is to learn those facts and apply them to answer certain questions. Based on how your thought processes interpret and evaluate the problem, you will provide a solution to the question. Many thought questions posed have multiple solutions (mathematical problem sets in KIN 402 do NOT have multiple answers!!). Many questions will require you to draw on prior knowledge (such as anatomy), in addition to current material, to answer a question.

Some additional points to consider when developing answers to questions (or when developing questions to ask):

- Be clear. Make statements or ask questions that are understandable and clearly reflect your thought processes.
- Be accurate. Make sure your statements reflect known facts, or statements that one can reason are true.
- Be precise. Give the necessary details to illustrate whatever point you are trying to make.
- Be relevant. Make sure that your statement or argument is relevant and pertains directly to the posed question.

- Provide depth. Make sure that you address the complexities associated with a question. Avoid superficial answers, as they do not demonstrate your knowledge or ability to critically think about a question.
- Provide breadth. Address alternate points of view. There may be more than one solution to the problem, so try to think from alternative perspectives.
- Be logical. Make sure your line of reasoning makes sense. Each idea should build on or flow from a previous idea. The combination of arguments should, as a whole, provide an answer to the posed question.

These principles are especially important in biomechanics. Many of you have not had physics or much mathematics. Therefore, the concepts and the application of those concepts is just as important as the mathematics behind the concepts. If you apply critical thinking to problems, whether those problems are mathematical or conceptual problems, you will greatly increase your chances of deriving an appropriate solution.