The Lecture Tutorial (LT) Discussion Boards (DB) should be the most active and valuable part of this course. Successful students engage in each LT forum regularly, multiple times per week, making several posts about each LT – sometimes to get assistance, other times to give it. The more you participate meaningfully in these discussions, the deeper you are engaged with the material, the more you are practicing articulating your explanations both verbally and in writing, and the better your chances of being successful on the assessments.

Read the advice here for working the LTs first. Then proceed to the instructions for actually posting in the DBs. That will help you get the most out of the materials and experiences and best prepare you to be successful on the assessments.

Doing the LTs:

Your LTs are designed to be done collaboratively, with a partner or in threes (max!). You'll notice that the instructions for the LTs tell you to work with someone if at all possible (whether it is in person, via Skype, chat, etc.) so that you discuss your answers, *arrive at a consensus*, write it down, and then move on to the next question, *always going in order*.

Answering the questions in the order they are presented is absolutely critical to constructing complete and correct explanations. The tutorials are designed in the style of a Socratic dialogue to help *scaffold* your knowledge; going out of order will only create confusion. Resist the urge to skip ahead thinking it helps answer previous questions; it does not work with this method. In fact, it can actually stymie your thought processes and cause you unnecessary grief. Successful students force themselves to be disciplined, carefully follow the instructions, and go in order.

Even if you don't have confidence in the answer to one of the questions, force yourself to commit to a response and write it down. Remember: it's impossible to diagnose whether you are on the right track if you don't commit to what you think! If it turns out you have an incorrect answer (that you might not even realize yet), one of two things will happen.

(1) You'll catch it yourself as you continue through the questions because a later one will force you to reconsider some of that previous information you committed to.

OR

(2) You'll have a realization as you are participating in the DB forum for that tutorial because another student's post will "ping your meter," so to speak.

Either way, you'll go back, correct it and any incorrect ones that follow it, and be back on the right track.

You also have pre- and post-LT questions (as explained in the videos on course philosophy and navigating the learning modules). The post-LT questions are another opportunity to check that you are on the right track with that concept. Recognize, though, that there are many reasons why you might miss one of these questions. That is to say that getting one of them incorrect doesn't automatically mean you have some grievous misunderstanding about the whole thing. Sure, that can happen. But if you've forced yourself to follow the directions doing the LT and been

meaningfully participating in the forum discussion about it, that's not likely to be the case. It's more likely that you have simply misapplied some of the information or even more simply, misread the question itself. This is also one of the reasons you have a second chance on the post-LT questions. Make sure to take advantage of it *after* you've taken the time to carefully review what you did wrong, diagnose ***why*** you did that, and then determine what the correct response is. Remember that you have access to help sessions, discussion boards, each other, etc. to help work out any lingering issues. Just act on it quickly; don't wait until a time crunch when it becomes overwhelming.

Posting in the LT DB Forums:

The online environment doesn't always afford the opportunity to work on the LTs collaboratively, as they were designed (see the previous section on "**Doing the LTs**."). This is why we have the LT DB forums, to assist and "simulate" some of the conversations you would have if you were working collaboratively in an on-ground class.

You will be formally graded on a minimum of two posts for *every* LT that we do, an initial and a response. There is a grading rubric; make sure you review it before making a post and have it handy to refer to while you are composing each of your posts so you can be sure to "tick all the boxes" and earn as many points as possible. Successful students make meaningful posts more often than what is required, making sure they adhere to the rubric each time.

The Initial Post:

Choose any two questions in the LT and post your answers to them *and the evidence and reasoning that led you to those answers*. Answers without supporting evidence and reasoning do not earn credit.

Many of these are due on Thursdays (*see your specific course materials for actual dates and times!*) and you must get them posted early anyway since *everyone's abilities to make their response posts depends on the availability of the initial posts*. Everyone can't be on time for everything; we know...we're human (presumably). But there is an entire class full of people all being held to the same standards, trying to do the same things, and be successful at them. That means there should **NEVER** be a case where a substantial fraction of the class is not making their initial posts early enough in the week. There are enough people that even if a couple of you have a nightmare week and don't make a Thursday deadline, the rest of the class has still made initial posts early enough to perpetuate a robust, helpful discussion. *Remember, many folks not contributing their initial posts per LT early enough in the week could end up putting everyone at a disadvantage – including you!*

It's okay to be wrong! Why would you assume you need to be right all of the time? *The process of learning can only occur because we are wrong and/or have incomplete mental models some of the time!*

Initial Post: Good Example:
This is Suzie's initial post. It follows the directions and, based on the grading rubric, will earn full credit if it's on time. It comes from the "Blackbody Radiation" LT.

> "Q7: Star E: it peaks over the short wavelength end of the spectrum where the bluer colors are and the vertical axis shows the amount of output.
>
> Q12: I agree with Student 1 and disagree with Student 2. Student 1's first sentence is correct because that's just Wien's law that we learned in our reading and lectures. Student 1's second sentence also makes sense. If the two stars give off different amounts of energy but are at the same temperature, it seems the only way one could give off more energy than the other is for it to be larger. Student 2 is confusing energy output with temperature and then contradicts himself."

Initial Post: Bad Example:
This is Jamie's initial post. Even if it's on time, it will definitely not earn full credit (and maybe none at all; see rubric). It comes from the "Blackbody Radiation" LT.

> "Q7: Star E: it's shown on the graph.
>
> Q12: Student 1: #2 doesn't understand temperature."

The Response:
Choose anyone's initial post (not your own!) and respond to one of his/her/their two questions. Your response must provide *additional evidence and/or reasoning that either supports his/her/their answer or shows how it is incorrect and then fixes it*. Responses without additional supporting evidence and/or reasoning do not earn credit.

If someone else has already responded to the one you wanted, you can't use that one for credit and must select another. For example, if I wanted to respond to Suzie's Q7 but someone else has already done so, I won't get credit for another response. I could respond to Suzie's Q12 if no one else has already. Or, I could choose Jamie's Q7 if no one else has. Or I could just choose another student+question combo altogether.

Note that even if someone else has responded to Suzie's Q7 and you still think there's more to be said, e.g. you can still contribute meaningfully to the discussion beyond what the responder said, please do so! Just understand that this one won't count for credit here...but it could positively impact your grade later on because you went the little bit extra to make sure you (and others) were getting it. Successful students continue to do this repeatedly as it not only gives them more practice, other students typically find these discussions very helpful, especially if they're still struggling. *Participating beyond what is required for a formal grade can also turn struggling students into successful students because you are engaging more deeply with the material and giving yourself additional practice.* Depending on the topic, you might be one of the

more successful students or you could be one of the struggling ones. Either way, the tables can turn for each topic so help each other out as often as possible!

Most responses are due on Sundays (*see your specific course materials for actual dates and times!*). The quality of the posts generally degrades dramatically the longer you wait. And of course if everyone waits until Sunday to make their response posts, very few will earn credit since there will be confusion about who responded to what first. For example, if you and another student both wait until the last minute to respond and, unbeknownst to each other, are responding to the same student+question combo, even if you're both on time the one who's time stamp is earlier gets the credit. Don't put yourself into that kind of panic mode. It not only means this isn't actually a discussion but you end up not learning the material and, on top of that, are ridiculously stressed out when you didn't have to be (if only you'd planned and managed your time a little better).

Response: Good Examples:

This is Jose's response to Suzie's Q7. It follows the directions and, based on the grading rubric, will earn full credit if it's on time. It comes from the "Blackbody Radiation" LT.

> "Q7: I agree with you that Star E gives off more blue light. But the peak isn't relevant. Remember the peak is only important when we're asked about what color the object looks. In this case we're being asked to compare the amounts of blue light between Stars E and F. Since Star E's curve is higher over 'B' for blue light, and the y-axis is the amount of output, Star E gives off more blue light than Star F."

This is Jackie's response to Jamie's Q7. It follows the directions and, based on the grading rubric, will earn full credit if it's on time. It comes from the "Blackbody Radiation" LT.

> "Q7: I agree with you that Star E gives off more blue light. But since some people may not understand the graph, it won't be obvious to them. The x-axis shows the colors, or wavelengths, while the y-axis shows the amount of energy being given off. Since the question asks only about blue light we don't care about anything on the x-axis except where the 'B' is because that stands for blue wavelengths. So when we look at where the curves are over the 'B' we see that one (Star E) is higher than the other (Star F). Since height is on the y-axis and that's the 'how much' part, we want Star E. It's amount of blue is more than Star F's amount of blue."

This is Kris's response to Suzie's Q12. It follows the directions and, based on the grading rubric, will earn full credit if it's on time. It comes from the "Blackbody Radiation" LT.

> "Q12: I agree completely with everything you said. I just want to add that what Student 1 says is also stated in the LT in the second bullet point at the top of page 60. And I can expand on why Student 2 is incorrect. As you state, he confuses energy output with temperature because he thinks that if the curve is lower it corresponds to a low temperature. But the y-axis is energy output, not temp. So a low curve means low energy output. Then in the second sentence he says that the temperatures of the two stars are the same. But they can't be since he just said that the height of the curve means temperature and one is lower than the other! If the lower curve meant low temp and

> higher curve meant high temp then they obviously can't be the same temperature. Since the color of the peak gives us the temperature we know these two stars have the same temp – they peak over the same color. Then he makes it even worse by saying that same temp means same size. But how could two objects at the same temperature be the same size if they give off different amounts of energy? Wow, what a mess! :-)"

This is Irina's response to Jamie's Q12. It follows the directions and, based on the grading rubric, will earn full credit if it's on time. It comes from the "Blackbody Radiation" LT.

> "Q12: Are you saying you agree with Student 1 and disagree with Student 2? Remember we have the option to disagree with both or to agree with both so we need to be explicit and say who we agree and disagree with like it asks in the question. I do think that Student 1 is correct and Student 2 is wrong. Student 1 is correctly applying the law we learned in the lecture and book (Wien's, I think? it's also given on page 60 in the LT). Student 2 thinks the height of the graph gives temperature so he didn't understand the law or read what's labeled on the graph. And then he says a bunch of confusing stuff that doesn't match either the graph or what he just said in the previous sentence."

Response: Bad Examples:

This is Jamie's response to Suzie's Q7. Even if it's on time, it will definitely not earn full credit (and maybe none at all; see rubric). It comes from the "Blackbody Radiation" LT.

> "Q7: Yeah E: it's the height."

This is Jamie's response to Suzie's Q12. Even if it's on time, it will definitely not earn full credit (and maybe none at all; see rubric). It comes from the "Blackbody Radiation" LT.

> "Q12: Yep Student 1, he explained it right."

Additional Remarks and Tips:

Whether your post gives or needs assistance, *there must be ample evidence of your thought processes – you must make your reasoning explicit and clearly refer to the evidence*. This is the pinnacle of understanding – articulating your reasoning and thought processes such that that others can understand what you mean. *Even if you think you might be incorrect, you have reasons for answering the way you did.* It is important to articulate them and provide the evidence you used so that if you turn out to be incorrect, others can see where you went wrong and steer you in the right direction. And if your reasoning is actually correct, you may have just given someone else the boost s/he needed to get "over the hump" and make that concept click!