How will in-class group work be assessed/graded?

Conducting group work well, developing scientific and engineering practices and learning how to effectively learn and work in a group is essential for your science and engineering development. In your future work, you will likely work on a team of people that uses the different strengths of those people to complete complex tasks. In Electricity and Magnetism Projects and Practices in Physics (EMP3), you will learn physics by working in small groups and your instructors will assess you on three different categories:

- How well do **you** ensure that your group functions well and that all members develop an understanding of the physics (Group Collaboration)?

- How well do **you** develop your own understanding of the physics (Individual Understanding)?

- How well are **you** using and developing important process skills (Process Skills)?

Each category above will be scored out of 100 points.

These 3 scores will be averaged together using weight factors that play to your strengths.

In your grade for the week, your highest category score will comprise 1/2 of your overall score, the next highest will comprise 1/3, and the lowest will comprise 1/6. This allows you to focus your attention on improving your performance on a single category without sacrificing performance in the other two categories.

You will be provided with written feedback before the start of your next project based on your performance on the previous weeks' project that will focus on one type of participation that you excelled at and one area we would like you to work on in the next project and suggest how you might go about doing that.

At the end of the semester you will be allowed to drop your two lowest project week scores.

Each of the assessment categories is described below along with the expectations that will earn you a 100 in each category.

Category 1: Group Collaboration

"*Am I consistently checking on others understanding?*"

• Making sure that everybody understands the physics and what is going on in the project.

• Ask other group members about their understanding of the physics and project.

"*Is the plan we constructed understood by everyone and does everyone understand how the concepts we are discussing relate to each other and the plan?*"

• Make sure group members understand how the concepts discussed relate to each other and the project.

• When moving from one part of a problem to another make sure everyone understands how and why you are making this transition.

"*I should probe the understanding of others and explain when there are gaps in their understanding.*"

• When it is obvious that another group member does not understand something, ask questions to understand the gap in their understanding and then try to explain your understanding to plug this gap.

"*I should engage in constructive argumentation, it helps myself and others get a more complete understanding.*"

• Discuss with your group or group members when you disagree with them but always provide the reasoning behind why you are disagreeing, and, when possible, alternative ideas.

"I should negotiate multiple interpretations of the same idea. Is there a way I can help resolve this disagreement."

• Help negotiate disagreements within your group by identifying commonalities and differences in interpretations of the same idea/concept and help develop a resolution that addresses all concerns.

"*Is everyone discussing their ideas and reasoning? If not, I should encourage them to do so, they might have some good ideas.*"

• Encourage each group member to share their ideas and reasoning.

"*Does everyone have the same understanding of the problem?*"

• It is your responsibility to attempt to ensure everyone has the same understanding and is in the same place in the problem.

"*Am I listening to others ideas and making sure that their ideas are evaluated?*"

- Make sure that no idea is dismissed immediately and that you foster a group dynamic that values everyone's ideas.

"Is the group focused on the big picture?"

- Make sure your group does not focus on too many minute ideas or goes off on too many tangents
- Make sure the group is focused on understanding the physics as much as solving the problem

Category 2: Individual Understanding

"*Have I explained my understanding effectively to the group or to the tutor?*"

- If you understand a concept or part of the problem you should be able to explain your understanding in your own words to the group.
- You should try to communicate your understanding using real world examples.
- If it seems like an explanation of yours is not well understood, attempt to explain it in a different way.
- Have I answered any of the tutors questions, if not, why not, indicate to your group and tutor when you don't understand something.
- Can I explain the process that the group took to getting their solution?

"Does my understanding make sense to me?"

• In EMP^3 you have to be responsible for your own understanding. Check your understanding/ideas against those of the group.

- If you want to persist with an idea of your own when the group disagrees, this is perfectly alright thing to do but make sure that you supply evidence for your understanding.

"Do I understand this?"

- Look for possible mistakes in the model world, plan, and validation process and be willing to offer evidence and defend your position to the group when they attempt to discuss such mistakes.

- Make sure you test your understanding by testing it against that of your group and the tutors.

"How does my thinking relate with the groups?"

- Ask your group questions that are aimed at improving your understanding and ascertaining how your understanding relates to the understanding of the group.

"*Am I ready to participate?*"

- You should be prepared for class and be ready to discuss the problems and the concepts introduced in the pre-class homework – the pre-class homework will relate to in-class problem.

- A great way to prepare for class is reading up about the concepts that the pre-class homework is focused on and being prepared to answer questions on this concepts in class.

Category 3: Process Skills

The process skills category is focused on developing practices that are important to doing engineering and science. In this class the focus is on ***planning, decision making and modeling.***

"Did I have a role in the planning process?"

- There are five major steps in the planning process that you can be involved in (see planning document on P-Cubed website for more details):

    1. Come to agreement about premise of problem

    2. Fill out the quadrants board

    3. Connect the Facts/Lacking and problem statements to form a goal

    4. Identify the necessary concepts and equations

5. Carry out plan

Each of these steps can be quality controlled with the following forms of reflection.

1. Have the will to doubt
2. Base all arguments with evidence
3. Identify knowledge deficiencies

- Did your group carry out all the planning process steps?
- Did you apply any of the quality control reflection activities to any of the steps?
- Did I help iterate on the original plan if the original plan did not succeed?

"Did I have a role in any of the decisions that my group made?"

- If there were conflicting plans did I choose to advocate for one choice of the other with evidence?
- Was I involved in the decisions made around assumptions and approximations?
  - Did I know what made a good approximation in the situation in which one was needed?
  - Did I ask for or provide reasoning as to why certain assumptions were being made?
- Did I evaluate whether we had enough information to make decisions in the group?
- Did I evaluate the information being used to make decisions for accuracy and understanding?

"Did the group complete the modeling cycle?"

- Did I push the group to complete all the steps of the modeling cycle?
  - Did the group create a model world, make a prediction with it and then reflect on the reality of this model world and prediction?

- If the group used a simple model to solve the problem, did you push the group to discuss what relaxing the assumptions you made for your model will do to the simple model?

- Did the group check the accuracy of its predictions against reality?