**Research Project Description**

1. **Description**
   1. The goal of the final project is to provide an authentic (albeit condensed) research experience. During the project, you will practice many of the skills and habits of a research scientist: You will collaborate with a partner, perform a background review of your topic, identify a research question, construct a hypothesis, design and carry out a computational experiment, analyze or interpret your results, and communicate your work to an audience of your peers.
   2. Given the abbreviated timeline (and the additional goal of using this project to consolidate skills developed throughout the course) your research question should apply to the relationship between materials structure and materials properties. Specifically, I have provided a list of properties that may be investigated and a few examples of the type of research question you may ask.
   3. As with any significant research experience, you will have the opportunity to practice communicating your work with the scientific community. On the last day of lab, each pair will present their results to the class (and physics/chemistry faculty members). You will also submit a written report detailing your results.
2. **Timeline/Deliverables**
   1. **Project Proposal Draft** 
      1. **End of class, Tuesday, 10/31/23**
      2. See the template for guidance on how to write this. The draft in no way needs to be polished like a final draft. Just make as much progress as you can during class.
      3. My goal is to provide feedback on drafts by Friday, 11/3.
   2. **Project Proposal** 
      1. **Friday, 11/10/23 at 5pm**
      2. There is no lab 11/7, but I will review your drafts and provide feedback so that you can resubmit your proposals by Friday.
      3. Final proposal should have 3-5 references and be around 3-4 pages long (1.15-spacing)
   3. **Presentation**
      1. **Tuesday, 12/5/23 at 8:20am (Last day of lab)**
      2. Each pair will have about 15 minutes to present, and 15 minutes for questions.
   4. **Research Materials Submission** 
      1. **Friday, 12/8/23 at 5pm**
      2. Zip file of the directory used for this project
      3. Any spreadsheets, jupyter notebooks, or other material generated during your research
      4. A copy of your presentation
3. **Potential Properties**
   1. Dielectric Constant
   2. Bonding Investigation via crystal orbital Hamilton projection (COHP)
   3. Electronic Bandstructure
   4. Spin Orbit Coupling
   5. Phonons