

STEM Research from Home Ideas

COVID-19 Related

- Printing of face shield components with at-home 3D printers
- Perform literature review of all different methods of potential cures for Coronavirus
- Perform a literature review of all different methods of personal prevention methods and their effectiveness thus far as presented in the literature (past and recent)
 - I.e. Has 'social distancing' decreased the spread of Coronavirus in areas where this method has been employed? Or has advice on personal prevention equipment changed over time and why?
- What is the organic structure of COVID-19 and how does it compare to similar viruses?
- Research for ventilators made of non-conventional methods
 - Ex: breast pump used for motor
(<https://www.wusa9.com/article/news/health/coronavirus/maryland-engineers-turning-breast-pumps-into-ventilators/65-f70d5cb2-2fd5-43f2-ab3a-6547988612c8>)
 - Rice University students share plan for \$300 make at home ventilator
(<http://oedk.rice.edu/apollobvm/>)

COVID-19 Unrelated

- Literature Reviews of your research area of interest
 - High-entropy materials-related topics, such as alloys, ceramics, polymers, biocompatibility, fabrication/manufacturing, characterization, mechanical behavior, fatigue and fracture behavior, neutron/synchrotron diffraction, functional behavior, additive manufacturing, machine learning, high-throughput methods, weekly Zoom and Skype meetings/conference calls, theoretical modeling, paper/proposal writings, presentations, etc.
- Practice statistical analysis on data from a known video game (ex: League of Legends)
(<https://www.kaggle.com/bobbyscience/league-of-legends-diamond-ranked-games-10-min>)
- Simulation of novel electronic devices and circuits using tools like HSPICE, TCAD etc. The students will be able to remotely access the simulation tools. This will allow exploring unique circuit and device ideas for emerging nanoelectronics.
- Solidify learning in Matlab and find research applications for it outside of class
- Analysis of large public data sets (e.g. bioinformatics data sets)
 - Note: this is a good way to encourage students to learn tools such as programming languages for data analysis and open-source bioinformatic tools)

- Learn a new coding language or program. There are plenty of online tools and software to facilitate this, and many coding languages are open source.
 - Ex: Google and Apple both have independent coding languages
 - Ex: Learn Python the Hard Way, a free pdf with step-by-step guidance
- Learn and/or practice MatLab as well as CAD skills with AutoCAD (free for UT students through OIT)
- Familiarize yourself with topical research in mathematics and probability
 - <https://www.iitk.ac.in/math/research-areas-in-mathematics>
- Discover resources your national professional society has to offer. Many societies had virtual short courses available to their members prior to quarantine. These short courses can range from professional development to novel topics of research.
- Refresh yourself on previous courses. If you're graduating and going to graduate school, brush up on subject matter related to your thesis. If you're still in school review topics that will be built upon in the coming semesters.
- Take the time to read and familiarize yourself with the manuals for instruments in your lab. Learn how to calibrate them, or maybe there is a better way to be collecting data.