OLD DOMINION UNIVERSITY

REYES & HALES MENTORSHIP PROGRAM

REYES Mentoring Program 2021
Expectations and Timeline

SUMMARY AND BACKGROUND

Two of the most pressing challenges faced by the U.S. to meet projected workforce needs of STEM graduates are developing a STEM-literate citizenry and expanding access to women and diverse individuals who will guide scientific discovery. With the hopes of mitigating these and other outstanding issues in the scientific community, a diverse team of experts at Old Dominion University (ODU) have joined forces to create the Remote Experience for Young Engineers and Scientists (REES). This ambitious endeavor aims to inspire and train aspiring scientists and engineers of all backgrounds and increase student access and engagement in STEM-learning experiences. After ODU was forced to cancel the week-long High Achieving Latinxs in Engineering and Science (HALES) immersive campus program in summer 2020 due to the coronavirus pandemic, a team of volunteers created the REYES to deliver that experience to young learners, virtually, in their homes. That idea led to months of work involving more than 100 ODU staff members that eventually produced ODU's first global virtual STEM program.

The ODU REYES volunteer team partnered with experts from ODU, NASA, Thomas Jefferson National Accelerator Facility, and other partnering institutions who invested their time and talent to make the content available free of charge to ensure student access. Based on the topics, engagement, and reach, among other metrics, the program was a global success. It produced 81 live lectures on scientific topics that reached 7,335 learners in 115 countries. Lectures, courses activities, panels, virtual tours and opportunities for social engagement were held for eight weeks, with at least one topic covered every day. The entirety of the REYES material was recorded and made freely and publicly available on the REYES website at odu.edu/reyes.

In order to expand upon this effort, we created an **experienced research-based mentorship** component to the 2021 REYES program that would match students from secondary education and undergraduate students with researchers who will support and inspire their mentees during the summer months and possibly beyond. During this time period, students participating in the mentorship program will have the opportunity to learn the basics of computer science and engineering by enrolling in or watching the YouTube recordings of REYES's **Python4Physics** and **Fundamentals of Engineering virtual** courses. The students will be guided one-on-one through a personalized (research) projects, carefully designed to meet their academic stage. The students will be trained on designing a research presentation. Upon completion of the project, students will either write a report on what they learned and/or present their findings in a standard PowerPoint (or equivalent) oral presentation.

With the goal of engaging a diverse talent pool and providing equitable opportunities to pursue STEM studies, the REYES mentorship program will aim to remove barriers and unconscious bias that drives interested students away from STEM. To accomplish this goal, priority will be given to students that belong to a historically underrepresented group in STEM fields.

OLD DOMINION UNIVERSITY

REYES & HALES MENTORSHIP PROGRAM

TIMELINE OF PROGRAM

Mentors Receive Mentees List for Selection: **July 16th**
Mentors Selection: **July 25th**
Mentor/Mentee Pairing Completed: **July 27th**
Mentors Notified of Mentees: **July 27th**
Mentee Acceptance/Denial Letters Emailed: **July 27th/28th**
Mentorship Program Official Start Date: **August 2nd**
Mentorship 4-5 week minimum program: **August 2nd – September 3rd**
Mentor Selection of top presentation(s) due to REYES: **September 17th**
Post-survey sent to mentees and mentors: **September 3rd**
Presentation of top students: Last week of September or first week in October **(TBD)**

KEY COMPONENTS REYES MENTORSHIP PROGRAM

Mentoring and engagements:

One-on-one meetings: The mentee will meet at least once a week with their mentor. In addition to guiding the students through their research project and educational development, the mentors will provide support, helpful resources and insights into STEM career opportunities.

Weekly group meetings: In order to help foster a healthy collaborative environment, the program will have weekly group meetings. These will be hosted by either program mentors and/or REYES staff, which might include senior Teaching Assistants.

Assessment:

Final presentations and report: At the end of the 4-5 weeks, the students will present a written report and/or give a 5-10 min. presentation of their project. These will serve as an assessment of learning outcomes and the performance of the mentees throughout the program.

Assessment Options:

(i) **Research Project:** The idea is that the mentor would introduce the mentee to a new project. The project would ideally culminate during the summer, but the mentor is welcomed to extend this beyond the summer.

(ii) **Literature Review of a specific topic:** The mentor would meet weekly with the mentee to discuss reading material that has been agreed upon by the two parties. This could include an introductory book on a field of study or reading some foundational research papers.

(iii) **Virtual Job Shadowing:** For this, we encourage the mentor to be creative. For example, the mentee could join collaboration meetings, conferences, or workshops that the mentor is attending/hosting. The mentor should introduce the mentee to other members of their collaboration/team [students, postdocs, etc.] The mentor should then have follow-up meetings with the mentee to help contextualize the activities. The mentor should encourage the mentee to speak up when appropriate, so they can feel engaged.

OLD DOMINION UNIVERSITY

REYES & HALES MENTORSHIP PROGRAM

Requirements: At the end of the summer, the students will be expected to provide **a 2-4 page report and/or a 5-10 min. oral presentation on their project**. The REYES/HALES team will help train the students in the basics of science communication and how to use presentation software like Microsoft Powerpoint. The mentor is expected to provide guidance on the actual content that is being presented. Submission of final project (paper and/or slides) to the REYES team

Pre-/Post-survey: The program will administer pre- and post-assessments containing STEM self-efficacy items on overall program and mentor satisfaction, and open-ended questions assessing the program effectiveness to the degree to which the program was able to remove barriers and unconscious bias among youth that tends to drives interested students away from STEM.

Additional Enrichment Opportunities:

Python4Physics: The students are encouraged to take/watch the recordings of the existing Python4Physics course. This course is designed for individuals who have no prior programming experience. We provide hands on instructions on how to download the necessary open-source packages for all operating systems. We use an open-source language, Python, because it is remarkably simple, logical, powerful, and increasingly popular. During the 4 weeks, the students are taught the basics of programing, statistics, data analysis, calculus, classical mechanics, and more.

Fundamentals of Engineering: The students will be encouraged to take or watch the recordings of the three courses in fundamentals of engineering: Thermodynamics, Strength of Materials, and Fluid Mechanics. Each course is composed of two grand lecture sessions that are 1.5 hours long. There is also an interactive virtual laboratory experience following each session, in which students test their new knowledge virtually. The specific topics of the sessions are conduction heat transfer, steam power, materials under a tension load, materials under a torsion load, forces due to static fluids, and forces due to moving fluids.

Experts of panels: The REYES program has hosted over a dozen panels of experts. These will continue through the Summer 2021 session. As we prepare the schedule for the panels, we will assure that a portion of these specially cater to the mentees of the proposed program. Nevertheless, the mentees will have access to all the freely available REYES content.

Weekly Debriefing presentations: In order to encourage students to be fluent in designing and delivering technical presentations, it is encouraged to have the mentees present a weekly 3-5 minute informal talks on the progress of their research projects or topics they learned through the REYES program.

Continued Engagement:

Post-summer engagement: It is natural to expect that the mentors will maintain a connection with their mentees. This could be due to the fact that the mentees may request recommendation letters in the future or because of their continued research. The REYES team plans to host additionally events throughout the academic year to learn about the progress of the graduates of the program.

OLD DOMINION UNIVERSITY

REYES & HALES MENTORSHIP PROGRAM

REYES Mentor Program Paper and Presentation Outline

Students participating in the REYES mentoring program should follow this outline for their research paper and presentation. Mentors and students are encouraged to use APA style on their final paper and presentation.

I. Title/Cover Page
II. Abstract (optional)
III. Introduction and Statement of the Problem
IV. Limitations of Study
V. Methodology
VI. Literature Review
VII. Main Body of Paper/Argument
VIII. Conclusion
IX. References
X. Appendices