

# National Science Foundation 2018 Summer Research Experiences for Teachers (RET) Site

On

## "Engineering Design Challenges and Research Experiences for Secondary and Community College Teachers"

### GOALS, EXPERIENCES PROVIDED, AND PERFORMANCE EXPECTATIONS

Goals of the RET Site are three fold:

- ▶ *To educate and enrich science and math RET participants' content delivery in their classrooms by exploring the engineering design-and-challenge instruction process and the critical research skills used by engineers to solve open-ended real-world problems.*
- ▶ *To improve grades 6-14 student science and math achievement and stimulate interest in STEM careers as a result of better instruction delivered by RET participants trained in engineering content and design-based instruction.*
- ▶ *To support RET participants in becoming leaders by applying their research experiences in their classrooms and communicating those experiences to their peers.*

RET experiences include:

- ▶ RET participants completing a short, 1 week long course, *Engineering Foundations*, during Week 1.
- ▶ Two RET participants working as a **team** on one project for six summer weeks (Weeks 2 to 7). An Area Coordinator (Faculty Mentor) and a Graduate Research Assistant (Graduate Student Mentor) will train the teachers on the research topic and guide each research team on daily basis.
- ▶ RET participants taking a series of professional development seminars and workshops taught by invited team of highly experienced engineers and educators.
- ▶ RET participants receiving 40 contact hours continuing education credits for the summer RET experience.
- ▶ RET participants participating in four to five field trips.
- ▶ RET participants producing the following deliverables at the end of the seven-week summer RET experience:
  - An individual curricular Unit which uses challenge based learning (CBL) and engineering design process (EDP) pedagogy to take back the RET experience to their classroom.

- A team project report and PowerPoint presentation documenting: (1) the research project completed and (2) the classroom implementation curricular Units (two - one per RET participant) developed.
- An individual RET participant student audience poster. Since RET participants are not expected to be proficient in poster creation. Training and opportunities to create mini project posters are integrated in the *Engineering Foundations* course. A dedicated workshop on “Poster Making” will also be offered in which format requirements for posters to be created (1) at the end of the Summer RET Site and (2) after teaching the RET Unit and presented at the *2019 STEM Conference* will be taught.
- A short ( $\leq 3$  minute) team (two teachers working on the same project) research video for other teachers. Since RET participants are not expected to be proficient in video creation. Training sessions are planned specifically for this purpose during the summer.
- A team summary report of the summer RET experience for submission to NSF.
- An individual participant draft of a journal article or PowerPoint for a conference presentation.

Time and coaching support is provided for the production of the above deliverables during the seven-week summer RET program.

- ▶ Upon returning to the classroom, the RET participants will be implementing their curricular Unit in at least one course taught by them during the next year and conduct assessment of student learning following project protocols.
- ▶ Reporting for two, school year Community of Practice reflection meetings (planned for December/January and mid-March of 2018-2019).
- ▶ After teaching, the RET participants will prepare at least one poster for presentation at the regional *2019 STEM Conference* to be held in September 2019.
- ▶ Disseminating the RET results to other K-12 teachers and community and two/four year college faculty through a dedicated website by each teacher contributing the curricular Unit implemented.
- ▶ Longitudinal Reviewing Support:
  - The reviewing, critiquing, feedback and tracking progress of each teacher/team deliverable will be done by the *RET Resource Person (RRP)* using a dedicated Wiki Site developed for the project. Since RET participants are not expected to be proficient in creating and using Wiki, training sessions are planned specifically for this purpose during the summer.
  - Additionally, an *Engineering Education Resource Person (EERP)* will educate the teachers on engineering disciplines and occupations, and how engineers use the design process to solve real world challenges, and assist them in the development of an appropriate engineering challenge for their own class, based on the summer research.
- ▶ RET participants will receive following monetary benefits or equivalents:

- A total stipend of \$6,000 per teacher, paid as follows:
  1. \$3,500 by the end of the summer seven-week RET program;
  2. \$1,000 (\$500/meeting) after reporting for the two school-year Community of Practice reflection meetings and submitting the reflection report for each;
  3. \$1,000 after submitting the completed Unit template, post-RET Unit poster, and video approved for web implementation; and
  4. \$500 after presentation at the *2019 STEM Conference* in September 2019.

Note: The RET payments during the 2018-19 school year (total = \$2,500) will be made in installments and will be linked to the required items listed above (deliverables #2, #3 and #4). The registration fees for the *2019 STEM Conference* will be directly paid by the RET project.

- Laptop on loan until all Post-RET implementation.
- Supplies to conduct research projects during summer.
- Parking fees to park at UC for the seven summer weeks of the RET Site.
- \$350 support for Post RET classroom implementation.
- Additional Incentive Travel Funds are available for publication and presentation at a regional/national conference (other than the *2019 STEM Conference*).
- The RET project will cover costs for all books, supplies and handouts planned to be given to the RET participants during the 2018 Summer RET Site.

**RET performance expectations include:**

1. You will participate for the full seven weeks (**June 11<sup>th</sup> – July 27<sup>th</sup>, 2018**) from 9:00 AM - 6:00 PM. The lunch break is 12:00 Noon – 1:00 PM daily. No exception will be made requiring full-time attendance during the seven-week RET Site, except under unforeseen circumstances occurring during the RET Site, which will be reviewed on case by case basis. The daily RET activities are typically planned as follows: 20 hours per week devoted to research and 20 hours per week devoted to professional development activities and production of project deliverables.
2. Other than holidays no exceptions will be made to the schedule (no absences).
3. You will receive the full summer stipend (\$3,500) at the end of the seven weeks. Missing any days will impact the amount of money that you receive.
4. You are expected to participate in Pre- and Post-RET implementation, including time during the 2018-2019 academic year.
5. Post-RET implementation includes: implementing the curricular Unit designed during the summer from the RET research experience; conducting and documenting results of pre- and post-Unit tests and any other assessments conducted; documenting the reflection on the Unit implementation and lessons learned; collecting student attitude evaluation data; revising the video created in summer; preparing a Unit poster for the *2019 STEM Conference*; preparing a

short ( $\leq 3$  minute) video showcasing their Unit highlights for other teachers; and submitting the approved Unit Template, poster and movie to be posted on the RET website. After the Unit is taught, the final Unit Template, poster and video will be again reviewed and approved by the RET Resource Person.

6. You will be required to come to two after school, one hour, on campus (UC) Community of Practice reflection meetings (tentatively December/January and March 2018-2019) the second of which is a *Culmination Event* at which you will present their final Post-RET deliverables to the Project Oversight Advisory Committee. After the presentations the RET participants will participate in a final Post-RET Focus Group meeting, and thereafter complete the Post-RET Satisfaction Survey and Post RET Site Rating Scale Survey.
7. You will receive a laptop to keep only if you complete the full Post-RET requirements, otherwise the laptop will need to be returned. (Second year RET participants will not receive a laptop.)
8. You agree to come for an after school hour Orientation on campus (UC) sometime at the end of May 2018, to sign the contract and receive more information about the 2018 RET Site program. Attendance at this Orientation meeting is mandatory.
9. As mentioned earlier, the Post-RET payments (total = \$2,500) will be made in installments and will be linked to the items that are required as described earlier in item # 5 above ( final Unit Template, poster and video – all approved by the RET Resource Person).