

## **Kean University Culturally Responsive Education of STEM Teachers (CREST)**

National Science Foundation Noyce Scholarship Program Track 1 Ended Submission Late August 2022

### **Project Description**

**Introduction.** Kean University of New Jersey (Kean) submits this National Science Foundation Noyce Track 1 proposal titled, “Culturally Responsive Education of STEM Teachers” (CREST). Kean was founded in 1855 for the exclusive purpose of being a teacher-education college, and has remained focused on preparing educators since. The proposed project is designed to meet well-documented need to increase the STEM teacher preparation pipeline to fulfill growing vacancies in high-need local education agencies (LEAs); to equip incoming teachers with culturally responsive pedagogical practices to meet the needs of increasing diverse classrooms; and to employ pedagogical strategies such as placed-based curricular enhancements that have proven effectiveness in increasing diverse student performance in STEM. The proposed project will award scholarships to an prepare up to 28 STEM undergraduate students in the following target majors to teach in high-need LEAs: biology, chemistry, mathematics, and earth science. Kean is the third largest institution of higher education in New Jersey and currently comprises five undergraduate colleges and the Nathan Weiss Graduate College. Kean also hosts numerous research institutions, perhaps most prominently the New Jersey Center for Science, Technology and Mathematics, the Kean University Human Rights Institute, the Holocaust Resource Center, the Wynona Moore Lipman Ethnic Studies Center, and Liberty Hall. In recent years Kean has expanded to a satellite campus called Kean Ocean in Toms River New Jersey, where in partnership with Ocean County Community College Kean offers degree programs on their campus; a campus in the Skylands of Morris County New Jersey that serves as an outdoor living field laboratory; and has a foreign campus in Wenzhou, China. The proposed project is leveraging Kean’s vast resources and history of preparing highly qualified teachers to fulfill the needs of partner LEAs and the communities they serve.

### **I.Scope**

**Regional and Need:** In the July 2022 Report from the American Federation of Teachers, the Teacher and School Staff Shortage Task Force highlights the teacher shortage problem nationwide showing that every year, nearly 300,000 leave the profession—two-thirds before retirement age [1]. The authors go on to makes suggestions regarding how to reverse teacher shortages. Primary among those is to increase the diversity of the educator workforce through sustained teacher mentoring [1]. The teacher shortage problem is present in New Jersey where the number of teachers employed has decreased by 6.8% since 2008 while the population, and class sizes, continue to rise [2]. Despite this decrease and the significant teacher turnover rates New Jersey schools experience, the number of those completing teacher preparation has declined sharply in New Jersey. The 2018-19 school year was the first time in two decades when the number of New Jersey’s new teacher candidates was below 3,000, according to the most recently available data [3]. There are many factors that contribute to this decline. According to a recent study, a number of recent college graduates in New Jersey who studied education have decided not to become teachers. Their reasons vary, but experts say some students are giving up on their plans to teach over concerns about the COVID-19 pandemic, well-publicized fights over race and gender curriculum and a general lack of support for educators in the classroom [4].

In New Jersey in recent months, teachers have had to face controversies over masking in schools, the implementation of the state’s new sex education curriculum, complaints over how racial issues are taught

in the classroom and campaigns to remove controversial books from school libraries. An EdWeek Research Center/Merrimack College national survey released in April 2022 found teachers' satisfaction levels at an all-time low, with only 12 percent of teachers claiming to be very satisfied with their jobs, and more than 4 in 10 teachers saying they were very likely to leave the profession within the next two years [5]. All of this results in a leaky pipeline for college students to become a STEM educators. Not enough teachers are pursuing careers in STEM education. Those that do are not accepting positions in high-needs, low socioeconomic schools. Further, there is an immense need to increase the number of Hispanic/other underrepresented groups of teachers in STEM disciplines.

**District Roles:** LEAs will commit to the following: (1) coordinating an instructor for Tomorrow's Teachers (this dual enrollment course is the high school recruitment pathway). TT is already at Union, but will be expanded to Lakewood. The instructor will commit to promoting teaching, the Noyce project/scholarships, and provide space for the Noyce team to visit this course and recruit. Other students may have been recruited prior and will be referred to this course. (2) Serving at mentor teachers for CREST Scholars during their practicums. (3) Consideration of Noyce completers for open STEM positions. (4) Lead Teachers/Mentors will participate in the Noyce CREST Seminar Series, present on their pathways and experiences in teaching, etc. Each scholar will have a mentor teacher from a partnering LEA. Mentor teachers work with scholars for one full academic year.

**Partner LEA Needs.** STEM teacher turnover in high-need LEAs is problematic, and the state of New Jersey in particular is faced with significant challenges, specifically the urban and urban rim communities of New Jersey. Kean University will strategically partner with Union City School District and Lakewood Township School District in New Jersey, both urban rim with large Hispanic populations. The national and regional needs are reflected at partner LEAs, both classified as high-need based on the percentage of low-income students and the teacher turnover rates. Specifically, the project team is partnering closely with two high schools within these respective districts; Union High School and Lakewood High School. As displayed in Table 2, both high schools have higher rates of poverty than their respective districts (42.3% and 90.3%). These are both the largest schools in their districts with high numbers of traditionally underrepresented minority students (73.7% and 96.3% respectively). While Union has only 18.1% White students, 83.1% of teachers in the district are White; 8.2% are Black; and 6.3% are Hispanic [6]. There is a similar misrepresentation at Lakewood Township School District where 90.3% of teachers are White; 3.2% are Black; and 5.3% are Hispanic [7]. New Jersey tracks teacher turnover at the district level. While the national average teacher turnover is 8% [8], the New Jersey state average is 8.5% [6]. The target LEAs have a teacher turnover rate of 11.7% (Lakewood) and 6.2% (Union) respectively. While Lakewood's turnover is significantly higher than both the state and national average, Union's turnover is lower than both. However, due to the large size of Union, the 6.2% turnover rate represents 110 teacher vacancies each year. Due to the aforementioned leaky pipeline of qualified STEM teachers, 110 vacancies is a challenge to fill and demonstrates high need.

*Table 1. Partner High-need LEAs*

LEA	# of Students	Low-income	White	Black	Hispanic	Asian	2+Races	Teacher Turnover
Union City School District [6]	7,163	40.6%	18.1%	42.7%	27.3%	8.7%	2.6%	6.2% [6]
Union High School [9]	2,156	42.3%	18.4%	48.7%	25.1%	7.9%	1.1%	
Lakewood	5,251	88.5%	6.4%	5.9%	86.7%	0.4	0.5%	11.7% [7]

Township School District [7]								
Lakewood High School [10]	1,313	90.3%	3.2%	6.2%	89.8%	0.5%	0.2%	

**a. Number and Amount of Scholarships, Stipends, and/or Fellowships, along with the rationale for the number and amount**

The proposed project was developed in partnership with LEAs, their identified needs, and inter-departmental collaboration within Kean. In order to address the need for diversity in the teaching pool in partners schools, the need to address the leaky pipeline in teacher preparation programs, and the need to address high teacher turnover, the project team has crafted the proposed project based on the following **theory of change**: Kean University’s project team posits that through the implementation of a three-prong strategy of recruitment, training, and retention, more persons from underrepresented groups in STEM, in particular Black and Hispanic females and males, will be attracted to STEM high school teaching, gain expertise in culturally sustaining STEM pedagogy and place-based STEM curriculum, and increase persistence as STEM educators. Kean’s plan spans recruitment to target underrepresented groups and promote attractiveness of a career as a teacher, training during the undergraduate degree completion including preparation to teach in today’s culturally diverse classroom environment, and sustained mentorship with colleagues in both the science/math disciplines and community of educators in order to retain the CREST Scholars as STEM high school educators. Kean’s Noyce proposal seeks to contribute to one of the American Federation of Teachers proposed solutions to the teacher shortage by diversifying the educator workforce through sustained mentoring by focusing on urban communities in New Jersey. By capitalizing on the diversity of student demographics at Kean University, the project team aims for at least 50% of CREST Scholars to be from underrepresented groups in STEM over the span of this five-year grant award.

As such, the project team has two overarching goals that drive the project objectives. Table 3 contains the proposed logic model with goals, objectives, activities, and expected outcomes.

<i>Table 2. Project Logic Model: Goals, Objectives, Activities, and Outcomes</i>
<b>Goal 1: Recruit and prepare high school science and math teachers.</b>
<b>Objective 1.1:</b> Recruit 28 (??) STEM majors/CREST Scholarship recipients to attain teaching licensure committed to teaching in high-need LEAs (50% of whom will be underrepresented minority students).
<b>1.1 Activities:</b>
<ul style="list-style-type: none"> <li>• <b>Primary:</b> Recruitment of current Kean UG science majors in freshman, sophomore, and junior classes; and high school seniors to be CREST Scholars at Kean.</li> <li>• <b>Secondary:</b> Recruitment among all high school grades to identify students considering becoming STEM teachers and that meet criteria. Follow the students through grades 9, 10, 11. Possibly provide academic and socio-emotional support for students that might not be at the top of their class, but that have potential.</li> <li>• <i>Inform primary and secondary students of this Noyce opportunity and the benefits of a career as a STEM educator through on-site workshops and campus visits.</i></li> <li>• <i>High school students take the Kean dual enrollment course EMSE 2801 (Intro to Clinical Experience P-12) during senior year in high school for schools through the Kean’s Tomorrow Teachers program. Hence, they begin their program of study prior to entering Kean.</i></li> </ul>
<b>1.1 Expected Outcomes:</b>

- **Primary:** Year 1 of grant, recruit 5 sitting Kean science majors to commit as CREST Scholars and another 6 in Year 2 of grant. Attain commitment of 8 scholars in Year 3 and 9 in Year 4. Hence, a total of 28 (??) over five years. Aim for 50% of CREST Scholars to be underrepresented groups in STEM.
- **Secondary:** through high school outreach and recruitment, will serve to funnel a sustainable pipeline of college-bound students interested in STEM educator careers beyond the duration of this five-year grant.
- *Kean's Tomorrow's Teachers program now in place in the Union NJ School District, with Noyce grant, will expand to include the Lakewood NJ School District. While not exclusive to STEM, the Center for Future Educators that oversees Tomorrow's Teachers reports 43% of participating students chose teaching as the career they want to pursue after college.*

**Objective 1.2:** Retain near 90% of original CREST Scholars (25 of the 28) through strategies that foster professional engagement and motivation among science educators.

**1.2 Activities:**

- Identify a potential list of Kean science and math major students who may wish to commit to Noyce if/when a spot opens in a cohort.
- Form cohorts as Professional Learning Communities among CREST Scholars, Kean faculty mentors, and the high needs school district partner lead science and mathematics teachers (practicing teachers who will accept CREST Scholars into their classrooms).
- CREST Scholars engagement with Faculty mentors and partner lead teachers through Noyce CREST Seminar Series.
- Curricular training in culturally responsive teaching, social justice, and culturally sustaining pedagogy.
- Create CREST, a STEM educators hub for CREST Scholars and all NJ STEM educators, to have a meeting of STEM minds annually held at Kean's Skyland Campus/Conference retreat venue.
- Kean's College of Education and Kean's Science College will collaborate with Kean's Diversity Council to afford opportunities for CREST Scholars to network by their attendance and participation in various conferences and build their resumes and foster their motivation in their profession. Such networking will also afford CREST Scholars to make connections for summer work opportunities through the various middle and high school summer programs including those that are science/math specific that are held on campus in summer and which employ college student helpers.

**1.2 Expected Outcomes:**

- Retain 90% yearly of CREST Scholars and for a scholar who withdraws in any given year of the grant, recruit and fill that spot with another.
- Each grant year CREST Scholar cohort will engage with other grant year cohorts to foster peer-networks alongside their faculty mentors.
- Each fall and spring (12 per year) Noyce CREST Seminar Series on campus in a venue equipped to record and facilitate both live and remote interactive audiences. Speakers will be Noyce faculty mentors, lead teachers, then in later years of the grant Noyce Scholar alumni.

*Conferences:*

*At Kean Annual Kean CREST Conference at Kean Skylands Conference Center for all CREST Scholars, mentors, lead faculty and grant stakeholders*

*At Kean Annual Kean Research Day Conference in April that showcases UG student research*

*At Kean Annual Future Teachers Academy Conference for Tomorrow's Teachers program*

*At Kean Annual Kean Diversity Council High School Leadership Conference in November*

**Goal 2: Diversify and retain the science educator workforce in high needs school districts in New Jersey.**

**Objective 2.1:** Graduate and place near 90% of CREST Scholars (25 of the 28) in high-need LEAs.

**2.1 Activities:**

- PRAXIS II tutoring prep program (subject specific) for CREST Scholars.
- Career services skill building workshops (interview skills, resumes etc.).
- Teacher job placement in high need LEAs throughout NJ.
- Sustained mentoring of CREST Scholars by Kean faculty mentors and school district partner lead teachers during student teaching and first year(s) teaching in the classroom.
- Field Supervisors and Teacher Mentors assigned to Clinical 1 and 2 students will also be tasked with assisting interns to meet Clinical Competencies.

**2.1 Expected Outcomes:**

- Graduate & place 90 % yearly of CREST Scholars in high need schools within NJ to teach in their area of certification.
- 100 % pass rate on all licensing/testing/observation needed to be a NJ certified high school teacher in earth science, biology, chemistry or mathematics upon earning the Kean University bachelor’s degree.
- CCI Clinical Competencies
- # of students entering Bridge Course
- # of students passing edTPA

**Objective 2.2:** Track and support the persistence of Noyce Scholar alumni during their high-need LEA teaching service and beyond by providing mentorship and induction-support activities.

**2.2 Activities:**

- Track and maintain a database of Noyce Scholar alumni through their early careers teaching in high needs schools in NJ.
- CREST Scholar alum receive and provide sustained mentoring thru Kean by themselves becoming “big teacher” partnered with Kean CREST Scholar undergraduate in addition to continuing their networking with their Kean faculty mentors as well as the school district lead teachers for whom they are now professional colleagues.

**2.2 Expected Outcomes:**

- Ensure teaching service of 2 years taught in a NJ high needs school for each year of CREST Scholarship \$ is met and if not, Kean University identifies and pursues repayment from said individual(s).
- In years 4 & 5 of this grant, CREST Scholar alums who are beginning their teaching careers will return to Kean to present at the Noyce Seminar Series.

**Rationale for Number of Scholarships**

The project team anticipates awarding up to 28 scholarships to Kean STEM students who have at least a 3.3 GPA. As indicated in Table 1, there a large number of STEM students, many of whom are underrepresented minority students, which makes an ideal pool or potential CREST Scholars. Kean has a high number (2,119) of STEM undergraduates (Table 1.). STEM majors at Kean are often interested in pursuing medical school or another graduate school program that requires exceptional undergraduate academic performance. Therefore, there are high numbers of STEM undergraduates at Kean with grade point averages around 3.2 that does not meet the requirements of postbaccalaureate programs in STEM (around a 3.8). The proposed project will provide a strong opportunity for these students to continue pursuing STEM as educators and this offers a large pool from which to recruit. As illustrated in Table 1, Kean’s population consists of 20% African American and 34% Hispanic. STEM programs at Kean have larger representation of African Americans (22%) than the total undergraduate population (20%) and an equal representation of Hispanic students (34%). However, the education major is clearly under enrolling both African American (6%) and Hispanic students (28%) compared to the institution at large. The proposed project will target these groups in the recruitment process.

Table 3. Selected Demographics (as of Fall 2021)

Fall 2021	Total	African-American	Hispanic	2 + Races	First generation	Pell-eligible	Women
All students	10,573	2,127 (20%)	3,617 (34%)	238 (2%)	3,762 (36%)	4,971 (47%)	6,528 (62%)
All STEM majors	2,119	465 (22%)	726 (34%)	48 (2%)	700 (33%)	1045 (49%)	1166 (55%)
All Undergraduate Education majors	101	6 (6%)	28 (28%)	4 (4%)	35 (35%)	51 (50%)	64 (63%)
All Graduate Education Majors	10	0	2 (20%)	0	1 (10%)	N/A	5 50%

Kean has strength in its history as a teacher's college and has a track record of a large number of STEM undergraduate students that parallel the diverse student demographics of our University, which is another of our strengths. In particular, Kean is a Hispanic-Serving Institution (HSI) of higher education. Furthermore, as the urban research university of New Jersey and a public and predominantly commuter college, we educate students from urban areas who wish to remain in New Jersey. Hence, there is a high likelihood that CREST Scholars are going to remain in state for their careers.

## I. References

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