An Interdisciplinary Undergraduate Research Experience Program in Electrical and Computer Engineering - Lessons Learned through 6 Years of Program Operations

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Abstract:

The NSF-funded Research Experience for Undergraduate (REU) program titled “Interdisciplinary Research Experience in Electrical and Computer Engineering (IREECE)” has run for 6 consecutive years at Oakland University. The 10-week summer program ran in 2010-2012, was renewed in 2013, and finished in 2015. During this time, many valuable lessons were learned in the areas of: recruitment, student empowerment/mentorship, faculty involvement, and assessment; to name a few. The program developed at Oakland University was focused on minority involvement and inspiring students in their first years of undergraduate pursuit. Ultimately, 65 students from 30 different universities participated, 45% were female, 35% were minorities, and 69% were lowerclassmen. These undergraduates were given an invaluable experience in research resulting in 17 conference papers, 10 poster presentations, and a design that lead, in-part, to an award-winning aerial/marine quad-copter. In this paper, we share our approach to running the 10-week summer program with an emphasis on techniques and tips for those seeking to start a new REU site at their institution.

Introduction:

The Electrical and Computer Engineering (ECE) Department at Oakland University (OU) has hosted the NSF funded Research Experience for Undergraduate (REU) program titled: Interdisciplinary Research Experience in Electrical and Computer Engineering (IREECE) for the past six years. The program supported 10 students each year. In addition, the School of Engineering supported 5 additional students over the six-year period. In total, 65 undergraduates participated in the program with only two students repeating the program for two consecutive years. The IREECE program was designed to target students that are underrepresented in STEM fields or had few research/graduate school opportunities at their home institutions. Also, preference was given to undergraduates at the freshman or sophomore level. Our choice of target audience has been shown to be the most benefited by undergraduate research. Specifically, it has been shown that: undergraduate research has an overwhelming positive effect on students, engaging students early in their academic career helps retain students in the STEM field, undergraduate research is linked to heightened graduate school performance, and undergraduate research is a key factor in improving underrepresented minority persistence in STEM.

Once recruited, the goal of the program was to immerse the participants in active research environments overseen by engaged faculty mentors with two students assigned to each mentor. The one-on-one mentorship was a key factor of the program which allowed the faculty and students to overcome both technical and personal issues throughout the 10-weeks. Ideally, the participating students would gain:

- Long-term collegial relationships with faculty and expert scientists from industry and other organizations
• An exciting research experience working on real-world problems
• An increased understanding of the nature of research and scientific reasoning
• An improved attitude toward careers in research and graduate studies in STEM fields
• An increased knowledge in science and engineering and their role in solving practical problems
• And an improvement to their oral, written, teamwork, and collaboration skills.

The REU program allows the student to devote 10-weeks of undivided attention to gaining these highly valuable skills. In the following sections, we will describe the IREECE program focusing on student activities, recruitment efforts, and assessment results. Following these sections, we will focus on lessons learned and provide advice for faculty who may wish to start an REU program at their institution.

Recruitment and application process:

The recruitment efforts typically started late December to early January and concluded in mid-March. While successful in the past, competition for an undergraduate’s time during the summer seems to be increasing. Thus, it is suggested that recruitment efforts begin earlier (see lessons learned section for more details). The primary avenues for recruitment were through past program alumni, emails to school and college recruitment or career services, and professional society events. To reach the target pool for IREECE, special attention was paid to the Women’s College Coalition, the National Association of University Women, the IEEE Women in Engineering, the Society of Women Engineers, the National Society of Black Engineers, the National Association of Multicultural Engineering, the American Indian Science and Engineering Society, and at five universities in the local area, which have a large African American population.

Flyers were emailed to these and other institutions throughout the nation. Many colleges, societies, and universities that maintain a career services database which lists employers who recruit from the institution. Registering the REU with these databases allow recruitment efforts to continue year-round. In addition, past participants, faculty acquaintances, and collaborators on other projects, have been valuable source of quality applicants.

The applicant pool tended to range between 30 – 60 individuals who were selected based on their academic record, a narrative essay about their motivation and goals, and on a letter of recommendation. The applicants were first arranged into two groups, target and non-target applicants. Each pool was then ranked against others in that pool. It has been found that GPA is a key predictor of success and benefits of undergraduate research, but this factor has a much higher impact for students at the junior or senior level. Thus, a holistic approach was used to rank each candidate in which a low GPA would not automatically disqualify an applicant as long as there were other positive aspects within the application. Positive aspects included: extracurricular activities that demonstrate ability to work on a team, personal statement demonstrates a passion for a particular area of research that matches the planned REU projects, no prior research experience, home institution lacks research opportunities, high GPA in particular course(s), and/or exceptional recommendation letter(s). At least six quality applicants from the target pool
were selected. The remaining four slots would go to the highest ranked applicant in either target or non-target pool.

The only factor that could automatically disqualify an applicant was lack of or poor performance in a key entry level ECE course. It was required that the applicant perform well in at least one engineering related course. The particular course could change depending on the project selection for a particular year, but the typical courses sought were one of the following: circuit, digital design, microcontrollers, programming in a particular language, and/or a science course that applies to a particular planned project. The course requirement was a must for the IREECE program since the target pool were freshman or sophomore level students. If not careful in the selection process, it would be possible to select a participant who was not prepared, thereby engendering frustration rather than empowerment in research.

**Student activities:**

Once the candidate pool had been narrowed to 10 students and the students arrived at the university, it was important to get them started on their projects quickly. Starting on the project quickly capitalizes on the students excitement at having been selected and finally arriving at the university. Students begin working on their selected project on Day 3 of the IREECE program.

On Day 1 the students are welcomed with a reception in the morning followed by an orientation session. The reception and orientation session allows students to get to know the faculty mentors and the other participants in the program. Everyone is given an opportunity to introduce themselves, and the program overview is presented. The orientation provides information on gaining access to helpful facilities or services on campus, and the students are made aware of what is expected of them throughout the program. Following the orientation session, the students are taken to lunch where they are able to get to know everyone involved in the program in an informal setting. Following lunch, the students are taken on a tour through campus, then instructed on the completion of all paperwork such as direct deposit of funds, reimbursement for travel, etc.

Day 2 begins with project presentation given by each faculty mentor and any graduate students involved with the projects. Students are given time to discuss the projects with the mentors before they are asked to rank each project based on their interest level and preparation for the project. The mentors then meet to assign participants to the research projects. Careful consideration is given to the student’s interest in and preparation for each project. In the last six years all students were assigned to their first or second ranked choice. Assigning projects in this manner has been very successful. The method ensures that mentors get students who are invested in and willing to learn about the particular project. The remainder of the second day allows for mentor student meetings and completion of any additional paperwork.

By Day 3, the participants have completed all paperwork and have been assigned to a research project. They are ready to devote their undivided attention to review of the literature or study of the current state of the research project within the lab.
After two days of working on the project, the first weekly meeting is held to discuss progress. The first meeting is primarily used to set the tone for the weekly meeting to be held throughout the rest of the 10-week program. Students each discuss their project with the group. The students are encouraged to discuss any hypotheses or planned approaches to the research.

**Weekly meetings:** All participants are required to attend weekly collaboration meetings which last for approximately 30 minutes. The students are encouraged to sharing their successes, frustrations, or ideas from the previous week of work. Each group is required to discuss their project, and all other groups are encouraged to ask questions, brainstorm solutions, or suggest new ideas. These collaboration meetings are designed to form an informal collegiate environment between all involved. The relationship formed between peers and faculty has been shown to be a critical factor for undergraduate students. During the first few weeks, the separate teams rarely meet outside of scheduled activities, but this begins to change between weeks 3 – 5. The collaboration meetings encourage the development of rapport between the participants and between the participants and the faculty mentors.

An additional 30 minutes were reserved each week for professional development. Professional development included: developing a research career, accelerating ideas to market, efficient poster designed for technical communication, graduate school, and STEM careers. Depending on availability seminars were given by graduate students, industrial partners, and/or fellow faculty.

Table 1 provides an example 10-week program schedule. In addition to the collaboration and professional development meetings, a few field trips are planned each year.

<table>
<thead>
<tr>
<th>Week Number</th>
<th>Weekday</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M</td>
<td>Welcome reception, introductions, and orientation</td>
</tr>
<tr>
<td></td>
<td>T</td>
<td>Project presentations and discussion, Project selection and assignments, completion of paperwork</td>
</tr>
<tr>
<td></td>
<td>W,R</td>
<td>Lab safety presentation and start of research project in small groups with mentors</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>Research, Program get-together (60 min)</td>
</tr>
<tr>
<td>2</td>
<td>M,T,W,R</td>
<td>Research</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>Research, Program get-together (30 min) Professional development seminar – “Developing a Research Career” (30 min)</td>
</tr>
<tr>
<td>3</td>
<td>M,T,W,R</td>
<td>Research</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>Research, Program get-together (30 min) Field trip (half-day) – “Intelligent Ground Vehicle Competitions (IGVC)” (half-day)</td>
</tr>
<tr>
<td>4</td>
<td>M,T,W,R</td>
<td>Research</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>Research, Program get-together (30 min) Professional development seminar – “Accelerating ideas/discoveries to market” (30 min)</td>
</tr>
<tr>
<td>5</td>
<td>M,T,W,R</td>
<td>Research</td>
</tr>
</tbody>
</table>
Projects and mentorship:

The REU program was developed around a mentoring approach aimed at training undergraduate students to become independent researchers. The framework of the mentorship was designed to be both educational and fun for the student participants. Below are six components that were emphasized in this program.

**Effective Mentor-to-Student Relationships**: Faculty mentorship was found to be a key predictor in the success of undergraduate research experiences. It is important that faculty mentors be selected based, in-part, on how accessible they are to students. Each group of student researchers were assigned to at least one faculty mentor. The group size for each project was constrained to be no larger than three participants. The faculty mentors are required to meet at least one time each week with students outside of the weekly meetings discussed above. By selecting faculty who are accessible to students, additional interaction may occur throughout the program. Ideally, each research project also had an assigned graduate research assistant either funded by the faculty’s research or through the NSF grant. The relationships that are established between the mentors and the undergraduate students are crucial in motivating the students to do their best work and to increasing their interest level in the pursuit of careers in research. The
faculty mentors are expected to foster this relationship to a point where the mentor becomes a potential reference for the students and/or their advisors in graduate school.

**Appropriate Projects:** The intellectual focus area of the REU site must match the target applicant pool. In the case of the IREECE program, the projects were selected to appeal to young students. The projects were selected to cover a broad spectrum of areas, such that participants were likely to find at least one area of interest. It is important that the projects are designed such that the specific project requirements and goals can be adjusted based on the student’s abilities early in the 10-week program. While it is important that the projects are challenging, expecting too much of the students can be devastating. Through the 10-week program the PIs and mentors are very conscious about students being overwhelmed and unable to perform. Faculty mentors work with the students to guarantee a sense of accomplishment at the end of the program. Table 2 provides a partial list of past projects.

**Table 2: REU Project Titles for REECE 2010-2015 (Partial list)**

<table>
<thead>
<tr>
<th>2010-2012</th>
<th>Automated Electromechanical Antenna Steering System for Mobile Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Design and Characterization of a Fully Differential MEMS Accelerometer Fabricated Using MetalMUMPS Technology</td>
</tr>
<tr>
<td></td>
<td>Gain and Pattern Optimization of End-Fed Dipole Antennas for DSRC Applications</td>
</tr>
<tr>
<td></td>
<td>An Inexpensive Accelerometer-Based Sleep-Apnea Screening Technique</td>
</tr>
<tr>
<td></td>
<td>A Mobile Glucose Monitor for Outpatients</td>
</tr>
<tr>
<td>2013-2015</td>
<td>Brain-Computer Interface for Volume and Tuning Control of a Radio System using the Emotiv EPOC+ Headset</td>
</tr>
<tr>
<td></td>
<td>Design and Implementation of Thermoelectric Module for use in Cerebrospinal Fluid Flow Rate Sensor</td>
</tr>
<tr>
<td></td>
<td>Digitizing the Fly Eye Sensor: Edge Detection of a Moving Object using an FPGA</td>
</tr>
<tr>
<td></td>
<td>Effects of muscle Fatigue Using</td>
</tr>
<tr>
<td></td>
<td>Electromyography Evaluation of a Quad-rotor Power plant for Dual-Mode (Air and Underwater) Operation</td>
</tr>
</tbody>
</table>

**Mutual Expectations:** The expectations at the program level are communicated to the student during the orientation process, but it is important that the faculty mentor(s) also communicate their expectations of the students. The students must also communicate their expectation of the faculty mentors, and they are given an opportunity to do so during orientation. In addition to the expectations expressed early in the program, mid and late program expectations are expected to be discussed during the student’s weekly meetings with their assigned faculty mentors.

**Continuous Feedback:** It is the responsibility of the faculty mentor to provide feedback on quality and progress of the student’s work. Students have the ability to discuss their progress both in individual meetings with their mentor and in the weekly collaboration meetings. In addition, graduate students involved in the project are expected to monitor each student’s performance and progress in the laboratory setting. Ideally, concerns are addressed early, and the student is mentored to overcome weaknesses or deficiencies in regards to research. The faculty mentor is expected to provide constructive criticism to the students to help them gain the most from the summer program.
Assessment:

The program was assessed in a number of ways. The demographic data of the participants was used to determine the success of the recruitment efforts in engaging the target population. A preliminary and exit survey were administered in order to assess the students’ attitude toward graduate studies, their expectations of the REU program, their level of preparation, and their areas of interest. A preliminary and exit technical test were given in order to gauge the students’ gain in intellectual knowledge within electrical and computer engineering during the 10-week program. An alumni survey was sent to past participant to determine the long-term effects of the program. Additionally, the success of each individual research project was measured, in-part, on the students successfully publishing their results with the help of their mentor(s).

Overview of Recruiting Efforts: The results of our recruiting methods were fairly successful with 69% of participants being in their freshmen or sophomore years, 45% of all participants were female, and 35% were of an underrepresented minority group. We had difficulty recruiting from non-research intensive institutions with only 22% of the participants coming from such institutions. It is possible that students from these institutions are not seeking these types of experiences for a variety of reasons. We seek to study this in the future.

Survey Results

Entry surveys given on the first day and exit surveys given on the last day, show an overall improvement in the understanding and attitudes of participants towards STEM careers and research. Three of the most representative questions that we asked on both surveys were:

Question 1: How much do you know about the different types of interdisciplinary jobs that require skills in ECE?

Question 2: How much do you know about the different types of research opportunities that require skills in ECE?

Question 3: How likely are you to go to graduate school to obtain a graduate degree either in or related to engineering within the next five years?

The scores were completed on a scale of 1 to 6. The comparison of the results in Figure 1 clearly shows the effect of the 10 weeks on the understanding of the engineering fields and of research. Question three, in specific, shows the increased interest of pursuing a graduate degree in an engineering field.

All of the comments that were received on exit and alumni surveys are extremely positive and encouraging. Two of the recurring themes that we noticed were (1) the appreciation the students
have for the close interaction, interest, and mentorship they received and (2) the effect the program had on the student’s career plans. Some representative quotes are:

“The REU gave me a taste of grad school. Before I started the REU, I had a fuzzy idea of getting a masters sometime later. Now I plan on getting a PhD before I start to work.”

“After the first week of the program I was unsure if I could continue due to a mixture of intimidation, nervousness, and overall uncertainty regarding whether I had what it took to contribute to the research instead of holding it back. I explained my doubts to [my advisor]; just having him take time out to talk to and reassure me rejuvenated my confidence and inspired me to believe that I had what it took. I accredit the rest of my progress in the program to that experience and I’m grateful for having such a great advisor.”

Using email, LinkedIn, Facebook, and other social media sites, we were able to get in contact with a total of 53 alumni of the program (82% of participants). At the time of preparing this proposal, 39 of the 53 contacted alumni completed a survey to assess the effect of their participation in the program. The following tables summarize the results of this survey.

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Not at All (1)</th>
<th>Limited (2)</th>
<th>Somewhat (3)</th>
<th>Significantly (4)</th>
<th>Very Significantly (5)</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>IREECE provided you with experiences that allowed you to see the breadth of ECE</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>16</td>
<td>19</td>
<td>4.4</td>
</tr>
<tr>
<td>IREECE provided you with an understanding of possible careers in engineering.</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>15</td>
<td>18</td>
<td>4.3</td>
</tr>
<tr>
<td>IREECE helped you in making future educational and career choices</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>9</td>
<td>26</td>
<td>4.6</td>
</tr>
<tr>
<td>IREECE influenced you (or reinforce your choice) to pursue education or a research career in science, mathematics, engineering, or technology.</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>12</td>
<td>24</td>
<td>4.5</td>
</tr>
</tbody>
</table>
Table 3 gauges the perceived effect of participating in our 10-week program on participants’ attitudes. The mean of all responses is above 4.0/5, speaking for the greatly positive effect participating in IREECE had on its participant.

**Publications:** For each of the 33 projects, the participants have developed a PowerPoint presentation, a poster, and a final report. The Posters and reports were presented in a joint public conference. In addition, the student’s work has produced a total of 29 publications: 17 conference papers, 11 posters presented at national conferences and meetings, and a design that lead, in-part, to an award-winning quad-rotor design.

**Lessons Learned**

The primary areas of importance for a successful REU program based on our last six years of experience are: recruitment, project selection, faculty involvement, and availability and support of graduate students.

**Recruitment:** An REU program must compete for students against: other REU programs, EPSCoR programs, internships, and summer employment. The best and brightest students begin looking for summer activities during the fall semester. Therefore, recruitment efforts must begin early. In addition, it is expected that including the faculty mentors and the expected projects on the requirement materials will result in a better applicant pool. We suggest registering and maintaining the REU recruitment information on employment databases at universities and societies throughout the year. The goal is to engage with applicants as early as possible.

It’s suggested that the recruitment efforts begin no later than early November. The deadline for the application must also be set early. The deadline for application to the IREECE program was set for mid-March each year. While we were successful at recruiting, we expect moving the deadline for application to early or mid-February will result in a better pool of students. Setting the date in February will capture both the early students and those students who wait to apply until after the break between semesters. By recruiting early, it is expected that fewer students will be lost to other opportunities. We found that our best candidates were choosing other positions before the March application deadline.

The first year the REU runs is always a difficult year for recruiting. Funding is a typically not announced until February or March prior to the first summer of the program. The PI and Co-PI of program will have to decide how best to handle this difficulty, but we expect recruiting as if the program will be funded will result in the best success. If the program is not funded, the PI will need to send an email to all applicants indicating the decision of the NSF. However, if the students are early enough in their program, their application can be kept in hopes of securing funding the following year. In the past, recruitment for the IREECE program began after successfully securing funding in the first year. This resulted in a short recruitment period and a smaller applicant pool, but we were ultimately successful in finding enough applicants.

**Project selection:** Proper project selection is key to a successful program. Important factors to project selection include: type of university, faculty mentors’ strengths, and the target student pool. Targeting younger students in the IREECE program resulted in projects that were of a more
applied nature rather than basic research. In addition to matching the target student pool, the applied research focus matched the strengths of the university, leveraged the surrounding industry, and fit well in the faculty mentors’ research areas. In addition, the applied nature of the projects allowed the students to successfully complete a portion of the work in the 10-week program, and the student was able to see how their contribution fit the overall project.

Student empowerment is an important factor to mentoring undergraduate research. If the students finish their 10-week program without understanding what it is they accomplished, they are unlikely to feel equipped to do and pursue their own research in the future. Undergraduate students who wish to continue research after leaving the program, usually have to seek out mentors at their home institution and possibly initiate the research by selecting the project and making a research plan. Thus, the type of projects and the mentorship that goes into those projects must be designed with the goal of producing independent researchers who are able to conceive of a problem, come up with a solution, perform a literature review, and break the problem down into component pieces.

Suggestions for project selection include: reserving a portion of an existing research project for the summer program, developing a new idea that requires preliminary data to prove or disprove a particular approach, or readdressing a past completed research project. Reserving a portion of a project may require adjusting a graduate student’s research plan, such that the student completes other portions of the research while waiting on the summer program results. If done well, the students get to see immediate results of their contribution. The results of the summer program are input into the existing project and publishable results are produced. Often, reserving a portion of the existing research is not feasible due to a delay negatively impacting a graduate student’s progress. Thus, it is important for a faculty mentor to develop a new idea or new direction for the research. Many times, this new idea must be confirmed with preliminary data. The REU students are put in charge of setting up the experiment and gathering the data. Finally, if a postponement or new project idea are not possible, readdressing a past research project is a viable option as long as the past project can be extended and linked to solving a larger societal or research problem.

Proper scope and focus of the projects leads to eager students who will oftentimes exceed the expectations of the project. Student should be taking charge of the project by the third week of the program. If ownership of the project hasn’t occurred by this time, it is possible that the project was outside the scope of the students assigned, and a readjustment maybe necessary. Flexibility in the goals and expectations of the project is a must. The faculty mentor may expect the students to reach a particular point, but the student may exceed those expectations or the expectations may exceed the students’ ability. Adjusting the goal of the project requires open communication between all parties involved on the project.

**Faculty involvement:** To securing funding for the REU, it is important that the best team is assembled. The senior personnel must be successful researchers with secured funding in an area that agrees with the intent of the REU. It can be difficult to gain the support of these individuals for the REU. Past experience has shown that some of these faculty don’t see enough of a return on their investment in supporting the REU. Securing matching funds from the college, school, or department can help in the recruitment effort.
Selecting the correct faculty for a successful REU can be challenging. The faculty needs to be: supportive and invested, interested in undergraduate research mentoring, able to develop an appropriate project, and their personal goal in participating in the REU needs to be the success of the students. We have found that the most successful research faculty, while willing to help in the first few years, can become so busy with their research efforts that they are unavailable in later years. Thus, the PI and/or the Co-PI of the program must be flexible. Seeking faculty commitments in the fall semester is better than waiting until just before the program starts. Beginning early allows the PI to determine who is and is not available, and provides enough time to develop alternative plans. We have found that the best solution to this problem is seeking help from junior faculty who are interested in developing preliminary research results for future proposals. Developing interdisciplinary projects between departments can also help. The interdisciplinary projects are typically co-mentored. Co-mentoring requires a project that can be split into two separate but related parts. With such a project, one mentor helps the team complete half the project, before the students are mentored by the second faculty member. We have found that even the busiest faculty member can typically devote at least 5-weeks to a group. When all else fails, the PI and/or Co-PI has been required to take on two teams and mentor students through two separate projects. While this solution has been successful, it is suggested that it be avoided.

Finally, it is suggested that a training packet or program be developed for potential faculty mentors. Faculty mentors are an integral part to a successful program, so it is important that they understand the goals of the REU. It is suggested that the training packet should contain at least: a list of the goals and objectives of the program, an explanation of the expectations of the faculty mentor, suggestions on development of a suitable project, and suggestions of what to expect from the program and the students. In addition, the six key dimensions of effective mentoring should be discussed. The six areas of effective mentorship are safety, preparedness, proactivity, patience, availability, and positive attitude. The training program should be no longer than a 2-hour meeting with the PI and Co-PI where interested faculty mentors are instructed on the program goals and expectations, and the faculty mentors can ask questions of the PI and Co-PI. It is suggested that this training be performed in the fall semester prior to recruiting efforts.

**Graduate student support:** Graduate student support is a benefit to both the students, the faculty mentors, and the graduate students. It has been found that pairing undergraduate and graduate researchers is beneficial to both parties. We suggest including support for graduate students in the budget of the proposal. It also doesn’t hurt to ask for additional support from the school or department for a graduate student. The students can aid in and support all the areas above (recruitment, project selection, and faculty involvement). Recruitment help can be in the form of flyer creation, registering and maintain the REU on recruitment databases, and selecting candidates. Graduate students can be a great source of project ideas both within a faculty’s research area or with new project ideas. The greatest benefit of graduate student support is in faculty involvement. No matter the level of the undergraduate, some training must be done to prepare them for the research area. If this training can be offloaded from the faculty mentor to supporting graduate students, the faculty mentors are free to focus efforts in other areas.
Conclusions:

The IREECE REU program has successfully run for the past six years. In this paper, we have outlined the efforts made in recruitment, student activity, mentoring, and assessment. Suggestions were shared in the lessons learned section concerning recruitment, project selection, faculty involvement, and graduate student support. We hope to implement the ideas in the lessons learned section in future funded REU programs at Oakland University.

References: