

# The Werner H. Kirsten Student Intern Program: A Community Collaboration

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## Abstract

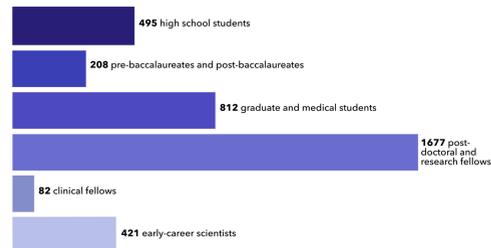
The Werner H. Kirsten Student Intern Program (WHK) brings rising high school seniors from the Frederick, Maryland area to the National Cancer Institute (NCI) at Frederick, where they spend a year working alongside scientists and conduct long-duration projects. Since 1989, more than 1300 students have completed the internship, and approximately 80 percent have gone on to careers in science, medicine and education. Students applying for the program begin preparations early in high school, adjusting their course work to (1) take STEM courses relevant to a scientific internship and (2) allow for a three-hour block of time in their daily schedules during their senior year, so they can report to the internship and earn four weighted credits towards their high school diplomas. Many of our interns have gone on to place highly in prestigious national and international science competitions such as Intel and Siemens. The program's success is due to strong, collaborative relationships developed and fostered over the length of the program. The NCI at Frederick works closely with local school systems to ensure that the internship continues to meet the educational needs of the students and schools. The schools work with the WHK program to help communicate the opportunity to the students and work with those who wish to apply, to ensure their coursework will prepare them for success in the program. In addition to the program being an outstanding opportunity for the students, many mentors have found great value in their participation. Thus, this aspect of the NCI's mission to train the next generation of its workforce, which is mandated by the Public Health Service Act, helps sustain the WHK program as a win-win-win partnership for all: mentors, students and schools.

## Who are we?

The National Cancer Institute is one of the 27 institutes and centers that make up the National Institutes of Health, a component of the Department of Health and Human Services. NCI funds, conducts and leads cancer research for the United States in its own laboratories and thousands it supports. NCI's mission includes training the next generation of scientists. The NCI at Frederick has an experienced corps of mentors who help support the mission of training and enhance the experience that the WHK students receive. In addition to scientific techniques and practices, students learn the same scientific rigor and teamwork, collaboration and comradery as any other NCI researcher.

## Training the workforce

In the 2017 fiscal year, NCI supported 3,795 emerging cancer researchers through training and career development grants and intramural research experiences.



## History of our program

In 1989, the Werner H Kirsten Student Intern Program (WHK) welcomed its first class of 6 students. Over the years, the program has developed a strong, collaborative relationship with Frederick County Public Schools and neighboring county public school systems. Today, each class totals approximately 55 students. More than 1,300 students have graduated from the program; many have gone on to careers in science and medicine or in support of science and medicine. Some have even returned to work at the NIH.



## How the program works

At the beginning of each school year, the WHK director visits high schools to share information with prospective interns about the program, with the assistance of school coordinators. The NCI at Frederick also uses social media to help notify students of important dates and deadlines.

In the fall, the WHK director also visits labs and offices across the NCI at Frederick, in the hunt for new mentors. This step is vital, since the number of students we can take is dictated by the number of mentors we have. Mentor applications open in December and close at the end of January each year.

Student applications are done online through a website. Students enter basic demographic information and choose research areas in which areas they wish to work.

Mentors also submit their applications through the website. They are asked to enter a training plan and project or projects, which are then reviewed by the WHK scientific advisor for appropriateness.

Interviews are very much a two-way street. Mentors do not make any offers; they rank students in order of preference. Likewise, candidate interns rank mentors. Each ranks the other on a scale of one to five. A computer algorithm we developed matches students and mentors, based on their preferences. Using the algorithm helps us avoid bias and nepotism. Once the matches are done, mentors and students are notified and can accept or deny the match.

After matching and acceptance of offers, students are required to attend a day of safety training, followed that afternoon by a welcoming ceremony. Safety training *en masse* ensures that students receive a consistent message. WHK interns work side by side with scientists in a professional environment, so we place great value on providing as much education and support as possible, to ensure a smooth transition.

During the incoming ceremony, students and parents/guardians get an overview of the year ahead. Over the eight-week summer session, students work 40 hours per week for. During the school year, when interns are earning academic credit and not a stipend, they are converted to a special volunteer status.

During the school year, interns spend a minimum of three hours per school day during their senior year of high school. In return, students receive four weighted credits. At the end of each quarter, the WHK director reminds mentors to submit reviews and suggested grades. The standardized reviews are entered into a

portion of the WHK website, to which we carefully control access. The proposed grades are then sent to the students' schools. Each school makes the final decision on what grade to give.

Students are required, during the school year, to make two presentations on their work. This can be during student poster days, research festivals, lab meetings, and other venues. The program also requires that students complete the full year of the internship. Those who do not return after the paid summer portion are removed from the program and are not allowed to identify themselves as WHK interns on applications or their résumés.

<b>September</b>	<ul style="list-style-type: none"><li>Put together all materials needed for school visits.</li><li>Schedule visits with all eligible schools/homeschool groups.</li></ul>
<b>October/November</b>	<ul style="list-style-type: none"><li>School visits</li></ul>
<b>November 1 - December 15</b>	<ul style="list-style-type: none"><li>Application open</li></ul>
<b>December 15</b>	<ul style="list-style-type: none"><li>Application closes</li></ul>
<b>December - February</b>	<ul style="list-style-type: none"><li>Mentors review applications and interview potential interns.</li></ul>
<b>March</b>	<ul style="list-style-type: none"><li>Student/mentor ranking takes place.</li><li>Matches are accepted.</li></ul>
<b>April</b>	<ul style="list-style-type: none"><li>Paperwork put together.</li><li>Administrative and mentor training.</li></ul>
<b>May</b>	<ul style="list-style-type: none"><li>Completed paperwork collected.</li><li>Student safety training day.</li><li>Incoming and outgoing ceremonies.</li></ul>
<b>June</b>	<ul style="list-style-type: none"><li>Interns begin the first Monday after school lets out.</li><li>Mandatory training: science skills bootcamp and orientation.</li></ul>
<b>July-August</b>	<ul style="list-style-type: none"><li>Oversee student intern activities: summer poster day, weekly journal club, weekly summer student seminar series, scientific "Jeopardy" tournament.</li></ul>

## Continual Improvement

The program has been in existence for 30 years; however each year we strive to improve it. We gather input from mentors, students, potential mentors, potential students and the schools. Some of those enhancements include:

**WHK Advisory Committee.** The advisory committee for the has helped to improve collaboration with the NCI at Frederick community and has established more consistent communication and feedback. The advisory committee is comprised of senior leaders from each division, office and center from NCI at Frederick people who speak to the community-wide needs and capabilities. Some representatives are WHK mentors, who give insight to reasons one might—or might not—choose to be a mentor.

**Fall Lecture Series.** Feedback from mentors helped us recognize that students entering the program often have limited knowledge of the kind of biomedical science NCI conducts. The fall lecture helps fill that gap through monthly talks given by NCI at Frederick staff members covering a variety of topics, from data analysis to why we haven't cured cancer yet. These lectures are in the evening, and parents are welcome. Students register for the lectures, and we take attendance so that when mentors are reviewing student performance, they can see which interns took this extra step.

**Science Skills Bootcamp.** This one-day course offered early in the summer covers techniques for keeping a good lab notebook, research ethics, hands-on practice in laboratory skills like pipetting and other topics of practical utility important for those who have not had experience working in a lab. Offering this course reduces the amount of time mentors need to set aside to do basic training and allows them more time to

focus research projects.

**Student Journal Club.** For many students, a WHK internship gives them their first exposure to scientific journals and the nuanced, complicated areas they cover. The student journal club helps them learn how to digest a scientific paper and to have a thoughtful discussion of its contents. The journal club meets over the summer and includes training from our scientific library on how to search for papers on a topic, how a scientific paper is structured, how research is submitted to a journal and the differences between journals. By the end of the series, students identify and present papers to the journal club.

**Student Jeopardy.** During the summer session, the NCI at Frederick Scientific Library hosts a friendly "Jeopardy!" style competition for summer interns. This lighthearted competition lets students interact with each other and with their mentors in a fun way.

**Summer Seminar Series.** The WHK director coordinates a seminar series, bringing in a variety of speakers to talk about their careers, their science and career skills, such as writing a professional résumé.



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## Collaborative Accomplishments

As mentioned earlier, over the past 30 years, the WHK program has graduated more than over 1,300 students. This could not have been done without strong collaborative relationships. The NCI at Frederick works to maintain fruitful collaborations between school systems, scientists and employees that make up our mentor pool, all with the support of NCI leadership. This collaboration is manifest in multiple awards and acknowledgements that the program, mentors and students receive.

**National and International Science Competitions and Publications.** Through the strong leadership of our mentors, we have seen multiple WHK students go on to become semi-finalists, scholars and finalists in various national and international scientific competitions, including Regeneron, Intel and Siemens competitions. Many of the WHK students leave the internship having been a co-author on a paper published in a scientific journal. Some have even been the first author on a publication.

**Acknowledging our Mentors.** Each year, one mentor receives the honor of being named the WHK mentor of the year. Students nominate mentors and the WHK Advisory committee reviews them, in order to select the awardee. This award speaks to the high caliber and dedication of our mentors.

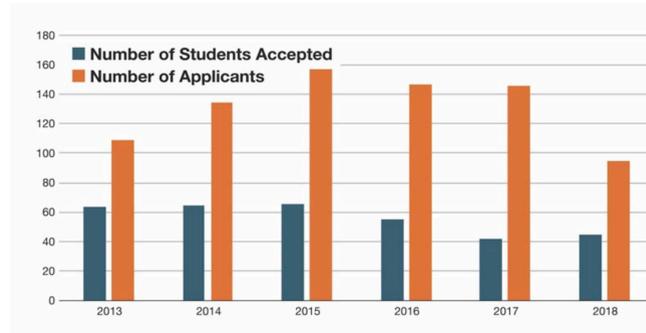
**Recognition from outside organizations.** The Frederick County Public Schools system has been a strong partner since the beginning of the internship program. Our efforts to offer their students a unique and valuable internship opportunity have been recognized through multiple local and state level awards, including a recent award from the State of Maryland Department of Education as an Outstanding Business Partner in Education.

**Recognition from NCI Leadership.** One of NCI's unique authorities is a mandate to present directly to the White House a professional judgment budget for each year. In that document NCI recognizes programs that demonstrate the agency's commitment to all facets of its mission, including education. For the past few years we have been honored by the inclusion of the WHK program in this document, to highlight the work we are doing to train a younger generation of scientists.

## Analysis of WHK data

A recent analysis found that mentors look beyond grade point averages and coursework to identify students of interest. Mentors also focused on responses to question sets, student letters and teacher references to gain insight into the student's skills. This finding helps us communicate to prospective students that, while G.P.A. and coursework are important, how you work with others, independence and what you do outside of school also matter.

Analysis of student application data showed that one school provided a disproportionate number of applicants. We are gathering more data to find out why. Potential reasons include socioeconomic factors an International Bachelorette Program. One item of note: This school begins to discuss the WHK program with students during freshman year, allowing potential candidates to plan their coursework early and to be better prepared for the internship senior year.



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