# Powerful Pre-College and Pre-Professional Supports: CWIT's Book-End Approach to Inclusive Excellence in Undergraduate Tech Education

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Cindy Greenwood is an Assistant Director of the Center for Women in Technology (CWIT) at the University of Maryland, Baltimore County (UMBC). In CWIT, Cindy manages the Cyber Scholars Program, which focuses on increasing the participation and success of women and other underrepresented students in computing majors with an interest in the field of cybersecurity. She also manages some of the Center's K-12 outreach programs to encourage girls to pursue their interests in computing and engineering and some of the pre-professional programs to help students prepare for their careers. Her previous experience includes work in student leadership development, campus programming, student organization management, and alumni relations. Greenwood holds a master's degree in Higher Education Administration from Washington State University, a B.A. in Advertising/Public Relations from Grand Valley State University, and is currently pursuing a graduate certificate in Community Leadership at UMBC.

**Ms. Erica L D'Eramo, University of Maryland, Baltimore County: CWIT**

Erica D'Eramo is the Assistant Director of the Center for Women in Technology (CWIT) at the University of Maryland, Baltimore County (UMBC). With a focus on professional development, programming, retention and inclusion in higher education, Erica's role in CWIT includes planning the CWIT Scholars Program, speaker series, Living Learning Community, First Year Experience course, Allies in CWIT practicum, Sophomore Leadership Practicum, and recruitment for both the Scholars and Affiliates programs. D'Eramo holds a B.A. in Business from Franklin & Marshall College and a M.A. in High Education Administration from the University of Michigan, Ann Arbor.

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# Powerful Pre-College and Pre-Professional Supports: CWIT's Bookend Approach to Inclusive Excellence in Undergraduate Tech Education


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UMBC

CWiT

The Center for Women in Technology

# AGENDA

1. **Introduction**
2. **Pre-College Programs**
   a. Impact
   b. Lessons Learned
3. **Pre-Professional Programs**
   a. Impact
   b. Lessons Learned
4. **Future Directions**
5. **Adapting the Model**
6. **Where to Start**
7. **Q&A**

The Center for Women in Technology at the University of Maryland, Baltimore County has a 21 year record of working to enable success for all women and other underrepresented groups in technology fields. CWIT supports students with a nurturing and challenging community, transformative leadership experiences, and professional development opportunities. Our goal is to prepare and empower our students to be change agents in creating technology workplaces that are diverse, equitable, and inclusive. Since the inception of our Scholars Programs in 2002, there have been over 300 Scholars and over 93% have either completed or been retained in undergraduate computing and engineering programs. We see these data as indicative of our growth towards our mission to enable success **for *all* women and other underrepresented groups** in technology fields.

In this presentation, we will highlight successful programs CWIT has used to enhance diversity and inclusion of underrepresented groups in the engineering and computing professions. These programs are designed to support the academic, leadership and professional development of undergraduate students and fall on two ends of a spectrum of support: *pre-college programs* and *pre-professional programs*. We will engage CoNECD attendees by sharing how these practices were motivated, developed, and implemented, as well as how we assess our impact and tips for transferring these practices to other settings.

# The Big Picture



## Vision

CWIT community members are prepared and empowered to be change agents in creating technology workplaces that are  diverse, equitable, and inclusive.

# CWIT Mission

The UMBC Center for Women in Technology (CWIT enables success for all women and other underrepresented groups in technology fields. In the College of Engineering & Information Technology (COEIT), CWIT supports students with a nurturing and challenging community, transformative leadership experiences, and professional development opportunities.


**Goal 1: *Program Delivery*:** Strengthen vital undergraduate Scholars and Affiliates programs committed to increasing the participation and success of women and other underrepresented groups in technology fields.
**Goal 2: *Community Building*:** Cultivate a supportive, diverse, community for all undergraduate women and their allies in computing and engineering at UMBC.
**Goal 3: *Gender Climate Research*:** Examine and address gender climate in COEIT through research on the undergraduate educational experience.
**Goal 4: *Pipeline Development*:** Create opportunities for girls to deepen their interest in computing and engineering with K-12 outreach programs.
**Goal 5: *Advocacy*:** Focus university-wide attention and resources on the needs of all women in technology education.
**Goal 6: *National Impact*:** Contribute to the national dialogue on educational best practices in technology education.

# Our Values


**Academic Excellence**

- Students develop a lifelong love for learning and discovery not only in the classroom, but also through applied learning and co-curricular experiences.

**Professional Excellence**

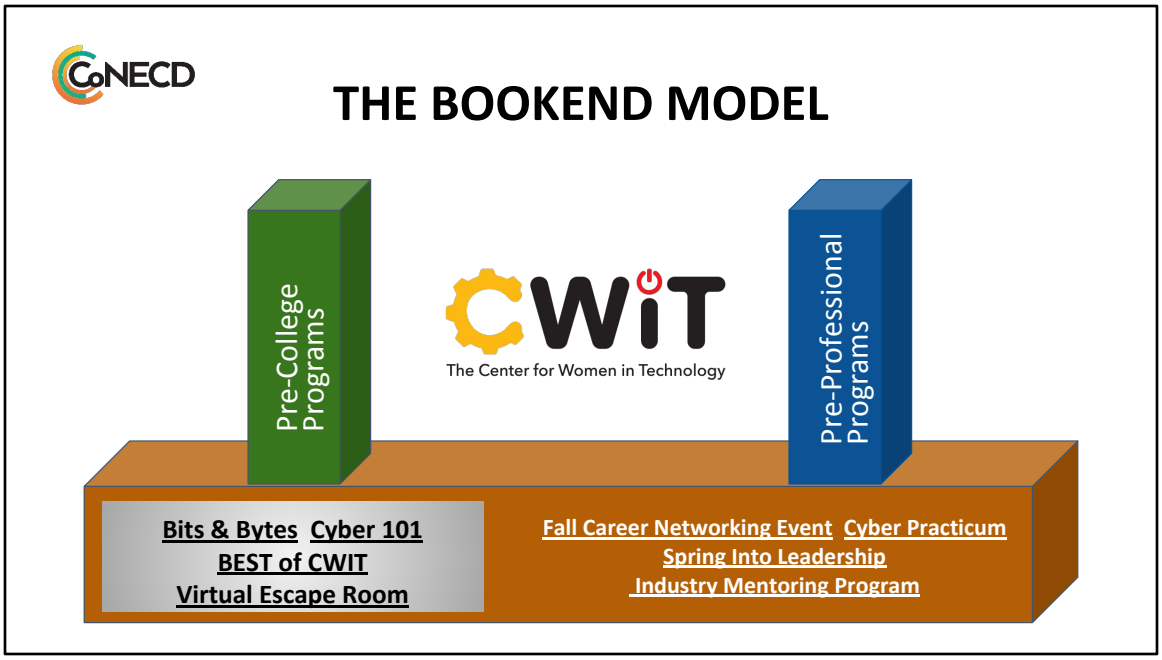
- We send our graduates into the next stages of their lives equipped with the knowledge and tools to effectively navigate their careers.
- Students are enabled to be change agents in creating technology workplaces that are diverse, equitable, and inclusive.

**Personal Excellence**

- Students learn to become their own advocates and to face difficult situations head-on, while also understanding when and how to seek help. No one gets through on their own.
- CWIT community members act with integrity, treat others with dignity and respect, and take initiative to develop as leaders throughout their time in our programs.

**Inclusive Excellence**

- CWIT community members are empowered to share their thoughts and ideas and to engage in thoughtful discussion when their ideas differ from one another. We strive to be a community where people across all identities feel included, valued, and heard.
- In order to foster a supportive and genuine community, we encourage bravery and vulnerability among CWIT community members. We hold one another accountable to CWIT values.
- CWIT community members engage in healthy and inclusive communication. Words matter, and have the power both to include and to exclude, to affirm and to damage.




We will discuss four signature initiatives, representing the pre-college end of our programming spectrum, including:

1. Our intentional event/program design and insight into the planning and execution process
2. Ways that each program promotes diversity and inclusion in computing and engineering
3. Strategies for understanding our impact and responding to participant feedback
4. Practical tips that others can use to adapt these initiatives

# PRE-COLLEGE PROGRAMS - OVERVIEW

**Purpose and Motivation**

- Encourage girls to pursue their interests in computing and engineering
- Help these students build a community of others with similar interests

**Scope & Target Population**

- High school junior and senior girls; mostly within Maryland, but some from other Atlantic region states

**Program Features**

- Two overnight programs, one day program, new Escape Room programs, others in development

**Purpose & Motivation**

Our pre-college programs are designed to encourage girls to pursue interests in computing and engineering fields; introduce them to other high school girls and college women who share their interests; show them glimpses of what it would be like to be a computing or engineering major at UMBC; and ultimately recruit them to enroll in a program in CWIT once they are admitted to UMBC.

**Scope & Target Population**

The pre-college programs target high school junior and senior girls, mostly from regional schools, but each year we tend to have a few from out of state. The programs typically have at least one session for parents/guardians/family members.

**Program Features**

We host four pre-college programs, all of which are co-planned and co-facilitated with planning committees of current students (with staff support).

- Two overnight programs (25 to 30 attendees each) that include meals at no cost to participants and the experience of spending the night in a residence hall. High school girls participate in team-based engineering and computing

- activities and design competitions judged by students, faculty and staff.
- One day program features a “conference” style experience for attendees with an option for campus tours and a Meet & Greet on the CWIT Living Learning Community.
- One Escape Room event features a game and storyline that are engaging for the participants; in order to escape the “room”, high school participants learn information about computing and engineering fields as well as UMBC and CWIT and proceed to the next puzzles.

# Bits & Bytes Overnight Event
# &
# Cyber 101 Overnight Event

## Overnight Events

| | Bits & Bytes Program | Cyber 101 Program |
|---|---|---|
| **Target Audience** | --High school junior girls interested in engineering or computing majors<br><br>--Application and Selection Process | --High school seniors (and some juniors) with interest in computing+cybersecurity<br><br>--Application and selection process |
| **Components** | --Planned and facilitated by a student planning committee (with staff support)<br><br>--Faculty panel (featuring women and male allies), alumni panel, engineering & computing competitions, social activities with current students | --Planned and facilitated by a student planning committee (with staff support)<br><br>--Technical content, residence hall experience, on-campus dining, time to network with college students, social time |
| **COVID-19** | Spring 2021 offering with be virtual | Fall 2020 offering was virtual |

**The Bits & Bytes Program**

Target Audience: Our target audience are high school junior girls interested in finding out more about the fields of engineering and computing. The characteristics that we look for when choosing our participants include female-identified, junior standing in high school, 3.0 GPA or higher, strong in mathematics and science, possess a desire to learn and explore engineering and IT fields, and display leadership qualities. These characteristics are chosen intentionally to not only provide an outlet for girls to explore the computing and engineering fields, but also to facilitate a supportive environment where the students are surrounded by other girls with similar passions and interests. We also work to create a balanced cohort in terms of computing and engineering experience, as well as in location. For many of our participants, this program is the first time they are at a tech-related event that is mostly female, so we make sure that all of the components of our program are welcoming, inclusive, and engaging.

Components: This event itself takes place on the Sunday to Monday of President's Day weekend. This is done intentionally so that students are able to attend the program without missing classes. Participation in this event include interactions with college students and faculty, an engineering or computing-related hands-on design competition, and general advice on being a strong STEM college applicant. Our student planning committee, as well as our faculty, alumni, and judging panels are comprised of women and male allies who have a connection to CWIT, and are able to talk about gender equity and the importance of female visibility in technology fields.

Additionally, we also host a formal discussion session on women in computing and engineering which is led by the student committee, which allows participants and mentors to share their experiences, achievements, and advice. Because this is an overnight event, participants are hosted by current freshmen who living on the CWIT Living Learning Community, which allows the participants to get the true college experience while also meeting our current students.

**The Cyber 101 Program**

Target Audience: high school senior and junior girls interested in learning the basics of cybersecurity

Application and Selection Process: We promote the program through direct emails to junior and senior high school girls via lists obtained from the UMBC Undergraduate Admissions office and emails to teachers via contacts of ours who forward the messages to Project Lead the Way (engineering) and computer science teachers in their networks. In addition to general contact, academic, and demographic information, we ask why students are interested in this program/what they hope to learn, what sparked their interest in computing/cybersecurity, whether their schools offer computing/technology classes and which they have taken, and what extracurricular activities the students participate in. In selecting students for participation, we choose a mix of those who have had quite a bit of exposure to computing classes and activities as well as those who may not have had the same opportunities, but who express a sincere interest in learning. We also consider the high schools, counties, and states where the applicants come from and their year in school. We aim to serve primarily Maryland students, with some from out of state each year. We also prioritize seniors over juniors since seniors are in the middle of college application season and this event could help them make some decisions. We also strive to have students from many different high schools and counties rather than a large concentration from any one place.

Student Planning Committee: The student planning committee is led by our two Cyber Co-Leads, two student leaders chosen through an application process each spring semester for the following school year. Additional committee members join the committee by completing an interest form. The committee members not only plan and facilitate the content of Cyber 101 (e.g., sessions on an Introduction to Linux, Cryptography, Malware, Network Security, and a Capture the Flag activity), but also serve as role models to the high school participants. The committee has always been majority women and typically includes students of different racial, ethnic, and religious identities. When men have participated in the committee, they are students from our CWIT community who receive education about being allies to women in technology.

Components: This event takes place on a weekend in late September each year, typically as an overnight program on campus, but was held virtually in 2020 due to COVID-19. As mentioned in the section above, the event includes several content sessions for participants to learn more about cybersecurity topics. Additionally, we spend time on activities to help the girls get to know one another, with a goal of helping them expand their circles of friends/contacts who are also girls who are interested in computing and cybersecurity. After they get to know each other a little, we discuss the students' experiences as girls interested in computing and typically

have many of them share that they have been the only or one of only a few girls in some of their classes. They also talk about ways they have been treated by classmates, whether their families are supportive of their educational and career aspirations, and other topics. Intersecting identities do also come up in these conversations, with students of color sometimes sharing experiences related to both their identities as young women and as women of color in computing classes and other tech-related activities. The planning committee students are great resources during these conversations, also sharing their own experiences with the participants. The committee members are also great resources in conversations we make time for regarding the college application process, choosing a major, and other pre-college topics that are on the participants' minds.

# BEST of CWIT Day Event


# BEST of CWIT Day Event

- Target audience
  - High school girls, specifically 9th-12th grades, with an interest in computing and engineering
  - Family members and educators of high school students interested in computing and engineering
  - Open Event: RSVP Form only, No Application
- Components
  - Planned and facilitated by a student planning committee (with staff support)
  - Conference style event
  - Meeting current students, faculty and staff
  - Learning about computing and engineering majors and status of women in tech
  - Overview of Scholars Program application process
  - Summer 2020- all virtual

This program includes a chance for students to learn about:

- the four year **scholarships** through the CWIT and Cyber Scholars Programs,
- engineering and computing **majors** from professors and current students,
- **research** and **internship** opportunities and experiences,
- **how to be a competitive applicant** in the Scholar selection process,
- role of community in each student's success and why inclusivity and diversity in computing and engineering are important
- issues faced by **women** in technology majors and fields

During this event, parents have the opportunity to hear from the Admissions office, Financial Aid, the Honors College, parents of CWIT Scholars, and more.

The 2020 BEST of CWIT is a ***virtual conference-style event*** will feature eight sessions each with the choice of three presentation options.

**Target audiences**

- High school students, specifically 9th-12th grades, with an interest in computing and engineering
- Family members and educators of high school students interested in computing and engineering

**Open Event:** RSVP Form only, No Application

Planned and facilitated by a **student Lead** and **planning committee** with staff support

**Components** of conference style event:

- Student, Faculty and Campus Partner Panels
- On Campus and Off campus student opportunities
- Industry and Research opportunities
- Overcoming academic challenges
- Meet with current students
- CWIT application process
- Parents & Family members of CWIT (PWIT) information session
- Escape Room & Team building

**Practical tips that others can use to adapt these initiatives**:

- **Identify highly involved professors** in the majors you support **and current students** to collaborate on program panels and Meet & Greet sessions
- Design an **email marketing campaign** that goes to high school students
- **Send email campaign to:**
  - 1) university email list for students in that major,
  - 2) Project Lead the Way instructors,
  - 3) other K-12 volunteer programs,
  - 4) Girls who Code,
  - 5) Parents/Family members of your group, and
  - 6) current students in your program (asking them to send it to their high school teachers and friends)
  - 7) University Admissions team/counselors
- **Schedule** the program in alignment with University's Admissions Events. BEST of CWIT is schedule in the afternoon, following a large university visit day that ends at 2pm. BEST of CWIT begins right after that event so students and family members do not need to make multiple trips to campus.

# CWIT Virtual Escape Room

- Target audiences
  - High school students and undergraduate students
- Open Event: RSVP Form only, No Application
- Planned and facilitated by a student planning committee (with staff support)
- Escape room topics:
  - By Major- learning graduation requirements, research, and other opportunities
  - Fun at UMBC
  - General information about UMBC
  - First Year students living on the CWIT Living Learning Community
  - Scholar Program Expectations

**Virtual Escape Rooms are a creative way to combine 1) a fun activity, 2) team building, and 3) learning new information.**

- **Target audiences**
  - High school students and undergraduate students
- **Open Event:** RSVP Form only, No Application
- **Planned and facilitated by a student Leader and planning committee with staff support**
- **Escape room topics:**
  - By Major- learning graduation requirements, research, and other opportunities (Information systems, Computer Science, Computer Engineering, Mechanical Engineering, Business Technology Administration, Chemical Engineering.
  - Fun at UMBC
  - General information about UMBC
  - First Year students living on the CWIT Living Learning Community
  - Scholar Program Expectations

# Pre-College Programs - Student Committees

- Committee Size
  - 6 to 20+, depending on event
- Recruitment/Membership
  - Application form
- Meeting Frequency and Duration
  - Form committees a few months in advance of event
  - Meeting frequency depends on event needs
- Staff Support
  - Staff may lead committee meetings (or advise a student who will do so)
  - Keep track of which students are leading which pieces
  - Facilitate student practice of their sessions to ensure quality

**Committee Size:** Depending on the program, the committee consists of anywhere from 6 students to 20 students. These numbers do not include additional volunteers that may be recruited closer to the actual event.

**Recruitment/Membership:** For BEST of CWIT and Cyber 101 Program, the committees are led by a staff member, as well as the Student Lead(s) for that particular program. Student Lead(s) apply for their positions each spring for the following academic year. Bits & Bytes is led by a staff member. Recruitment for the planning committees is done through email to current scholars and affiliates, and students apply by completing a Google Form. Student Lead(s) and staff select the planning committees. The students on the planning committees are made up of female-identified students and their allies who are able to speak about their experience within CWIT, but also within their major at UMBC.

**Meeting Frequency and Duration:** The planning committees are formed months in advance before each event to allow for enough planning time. The amount and frequency of meetings depends on the event's needs. Planning meetings also vary in size and who attends: some meetings involve the entire committee, while other meetings may just be a few students planning a specific session.

**Staff Support:** While these events are heavily planned and implemented by the student planning committee, each event has a staff member responsible for the

overall program. Staff members typically lead the committee meetings, or may advise a student to do so, keeps tracks of all of the logistics around the program, and assists student with preparing and practicing their sessions. This staff member also serves as the point person for the event in regards to participants, their parents/guardians, and other stakeholders.

## IMPACT & IMPLICATIONS

- Post-event evaluation survey sent for each program
  - Students report learning new skills and exploring educational goals in computing and engineering
  - Students are motivated to apply to UMBC and pursue our programs
  - Students meet and connect with new friends (other girls) in tech.
- Growing success with overnight attendees enrolling at our university and joining our program after attending Bits & Bytes (14%), and Cyber 101 (13%).
- Proportion of women among our Scholars has been stable at 72-73%; the proportion of underrepresented minority Scholars (URM) served by CWIT increased from 17% in 2016 to 24% in 2020

**Impact**

Annually, after each program is conducted, we assess our impact via post-event evaluation surveys. Many students who attend these events end up attending UMBC and getting involved with CWIT as Scholars or Affiliates (and sometimes becoming members of the planning committees to help plan and facilitate the programs for future girls). We have also seen an increase in the gender and racial diversity of the incoming students affiliated with CWIT. In the past three years of application cycles for our Scholars Programs, CWIT has noticed a timely shift in the demographics of our incoming cohorts towards increased racial diversity. While the proportion of women among our Scholars has been stable at 72-73% over this time period, the overall proportion of underrepresented minority Scholars (URM) served by CWIT increased from 17% in 2016 to 24% in 2020. We are currently assessing the impact (including increases in confidence and skills) of our new formal student leadership program, which our student committees now fall under.

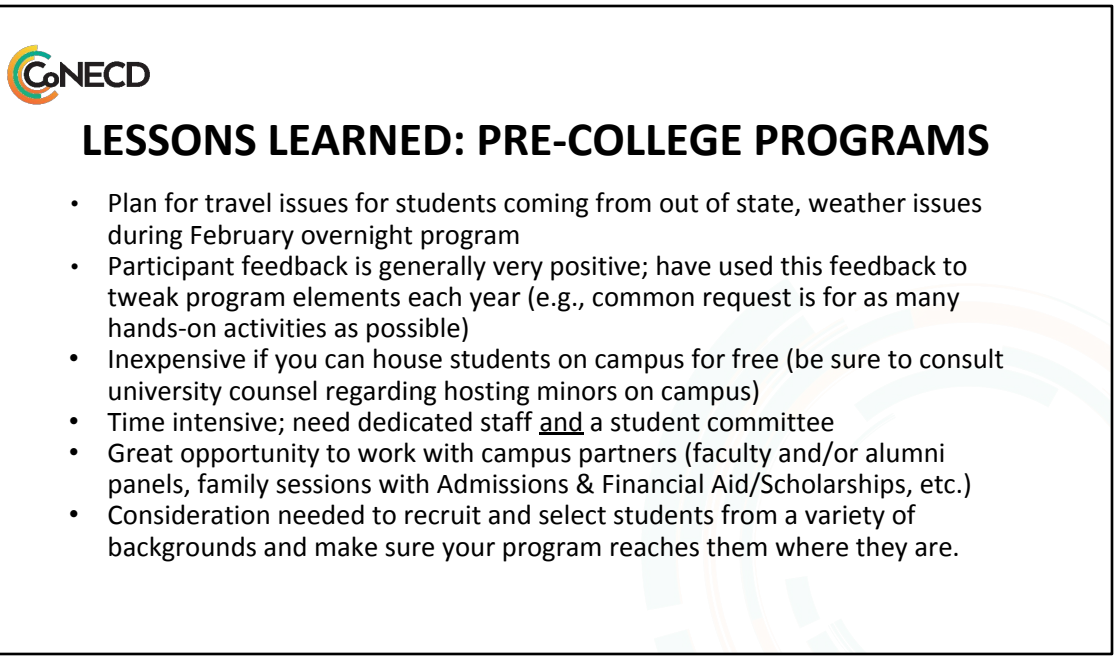
**Continued Email Engagement Post-Event**

For student who are already on our emailing list, they receive information for each of our overnight and BEST program. Then there is 2-3 emails sent a month to them about the CWIT Scholar and Cyber Scholar application. After February and Scholar selection, there are emails to the list (and other students who applied to UMBC/COEIT) about the CWIT Affiliates program, CWIT LLC, and Associates

Program. These emails continue through late April.

**Implications**
These events matter because they not only give high school girls the opportunity to learn what it would be like to be an engineering or computing major in college, they also give them the opportunity to connect with other girls with the same interests as them. On the participant surveys, many attendees mention that if they have taken computing/engineering classes in high school, they are typically either the only girl or one of the few girls in those classes. These opportunities allow them to share their experiences, meet successful women in the field (alumni/faculty panels), and bond with other girls with the same interests. Additionally, they are also great recruitment tools for UMBC and CWIT.

**COVID-19**
We will be interested to see if our numbers of students who attend our pre-college program and go on to apply to our Scholars Programs remain similar to past years or if they increase or decrease after this unique year where these programs have had to move online. On one hand, we were able to invite more students to participate in Cyber 101 and may be able to do the same with Bits & Bytes, so we could see an increase as we are reaching more students with these programs. Cyber 101 also received positive evaluation feedback from participants. However, the virtual experiences cannot replicate the opportunities to sleep in a campus residence hall, spend time in and around campus buildings, eat in the dining hall, and generally get a feel for what campus life might be like as a student there. It is possible that, despite having positive experiences with the programs, students may not build the same affinity for UMBC by attending the virtual programs as they do when attending in person. For our spring overnight event, we are preparing for a virtual version of this program in Spring 2021. The two biggest changes for our program will be the removal of the overnight experience, as well as a modified engineering design competition. To combat the loss of the overnight element, we are adding additional community building sessions to the program, as well as more opportunities for the participants to meet with current students. Additionally, the committee is exploring ways that the engineering competition can be done virtually, as it usually is completed with physical materials.




**Lessons Learned**

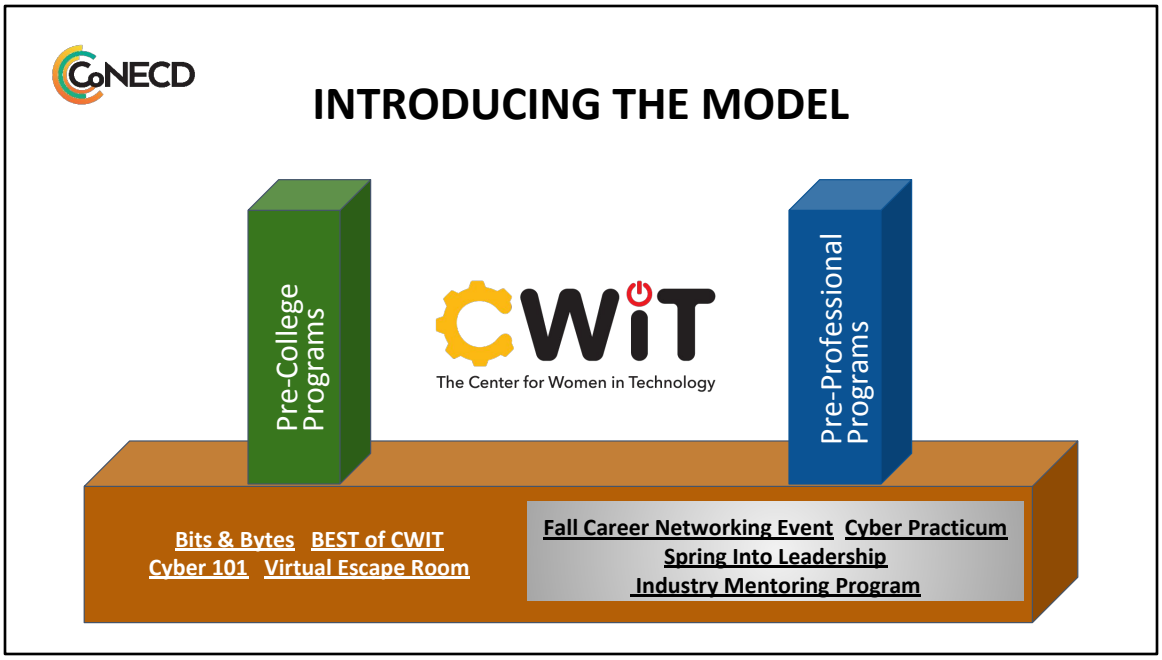
We have experienced both logistical and technical challenges with our overnight programs. There have been issues with the materials and software we use for the computing and engineering design competitions. Sometimes students are picked up early or we have to help students from far away states navigate flight changes and get to the airport in bad weather. We have mainly aimed to accept students who are within driving distance for that program since then. We consistently get feedback that students want the programs to be as hands-on and active as possible, so we have tweaked sessions to try to meet that request. Our day program has had challenges with yield numbers; one year, over 200 signed up for the event but only 75-100 actually attended.

For those looking to begin or expand programs for high school girls interested in computing and/or engineering, our model offers a variety of options. Overnight programs are time intensive for both planning and hosting and require consultation with university counsel regarding hosting minors on campus. We have been able to do this because we have found our UMBC students who volunteer as hosts to be responsible and dependable. We are upfront during the application and acceptance process that the high school students will be sleeping on the floor for a night and that they need to bring items to make that as comfortable as possible. Staying on campus is generally a requirement of the program, but we have made some exceptions when

a student and/or their parent reaches out to let us know about a medical or other issue that makes staying on campus impossible or far from ideal. The overnight component is of course not an issue when the programs are hosted virtually, though we do not expect to continue virtual programs once it is safe to be in person again.

Outside of overnight programs, day programs (multiple hours) or even a series of short (1-2 hours) events can be effective for K-12 outreach. These can still be time intensive and require staff and student support, but removing the overnight component does reduce liability. When held in person, food costs and purchasing “swag” items (e.g., branded t-shirts, drawstring bags, pens, USB drives, etc.) make up the majority of the budget for these events.

Beyond logistics, important considerations include how to market the event and conduct your selection process (if applicable) in a way that intentionally includes a diverse population of students. Diversity in this case includes race and ethnicity, but also extends to geographical location and rural vs. suburban vs. urban students as well as reaching and selecting students who have had plenty of access to computing/engineering courses and extracurricular activities alongside those who have had less opportunity or access. Programmatically, planners must also prepare to effectively serve a diverse group of students if and when you recruit them to participate. Finding the right level at which to teach content when participants have had varied levels of education and exposure to material is a challenge.




We will discuss four signature initiatives, representing the pre-professional end of our programming spectrum, including:

1. Our intentional event/program design and insight into the planning and execution process
2. Ways that each program promotes diversity and inclusion in computing and engineering
3. Strategies for understanding our impact and responding to participant feedback
4. Practical tips that others can use to adapt these initiatives

# PRE-PROFESSIONAL PROGRAMS

**Purpose & Motivation**

- Help students build their networks, practice their networking skills, and see themselves as computing and engineering professionals

**Program Features**

- Two large networking events and two semester-long Practicums

**Scope & Target Populations**

- 110-120 students at events; 25-35 students in Practicums
- 30-40 industry professionals, faculty, and staff at events

**Purpose & Motivation**

Our pre-professional programs are designed to connect students with professionals in their fields (build their networks), give students a place to practice their networking skills, and help students to see themselves as future computing and engineering professionals.

**Scope & Target Population**

The pre-professional programs are limited to students currently enrolled at UMBC and affiliated with CWIT. We may have up to 110-120 students and 30-40 professionals for the larger pre-professional events (Fall: professionals = almost all industry folks; Spring: mix of industry and faculty/staff); many industry attendees are also alumni. In our smaller pre-professional courses there are 20-30 students per semester and ~10-13 industry speakers per semester.

**Program Features**

We host two large scale one-day events (one in Fall and one in Spring), and two semester-long Practicum courses:

- The Fall event offers a unique opportunity for students to not only practice their networking skills, but also receive feedback from professionals in their fields of interest about what they do well and how they could improve. This event is set up as small group speed networking, with approximately two

- industry professionals and four students at each table. There are three rounds of 20 minutes and during each round, the group spends about 10-15 minutes networking and for the last 5-10 minutes, the professionals share feedback and tips with the students.
- The Spring event is planned and facilitated by a student planning committee with staff support. This event consists of open networking for about 30 minutes, followed by a keynote speaker who is a successful woman in computing or engineering, and then structured discussions at each table (seats are assigned so that each table is a mix of students, faculty/staff, and industry professionals/alumni). We were also able to hold a successful virtual version of this event in Spring 2020 when campuses were closed due to COVID-19.
- Our two semester-long  Practicum courses provide a smaller group of students an opportunity to participate in ongoing discussions about discipline-specific topics of interest and career planning topics in a more intimate setting with staff and industry professionals.

# Fall Career Networking Event

# Fall Career Networking Event

**Logistics**

- Small group speed networking; real time feedback to students

**Evaluation**

- Event evaluation forms sent to students and professionals
- Feedback on event logistics and professionals' opinions about what students did well and what they could use work on

**Challenges**

- Helping students to see the value of networking with professionals across computing and engineering fields (not only their specific area of interest)

**Lessons Learned**

The Fall Career Networking Event has generally been well-received by both students and the computing and engineering professionals who attend. Professionals who attend year after year have provided feedback that they can see the growth and development of the students from their first year through their senior year, as they become more comfortable in networking situations and as they have more experiences related to their majors that they can talk about. Students typically give positive feedback about the event as well and appreciate the connections they make (which sometimes informally lead to internship and job opportunities).

At this event, most years, seating is open, with space for two professionals and 4-6 students at each table. This sometimes leads to students sitting with professionals who are not in their direct area of interest. We do receive feedback that students would prefer to sit only with professionals in their same field and we have experimented some over the years with slight changes to the seating arrangements to allow for more of this. However, we also want students to recognize the value in talking with professionals across the computing and engineering space, not only those with the same interests as them.

# Spring Into Leadership Event

## Spring Into Leadership Event

**Logistics**

- Keynote speaker and table discussions about topics covered, followed by share-outs and/or Q&A with speaker
- UMBC faculty and staff invited as well as industry professionals

**Evaluation**

- Event evaluation forms sent to students and professionals
- Feedback on event logistics and professionals' feedback about whether the event met their expectations and suggestions for future

**Challenges**

- Difficulty recruiting chemical and mechanical engineering professionals (this issue also affects other pre-professional programs)

**Lessons Learned**

This event is planned and facilitated by a staff member and student planning committee working together as a team. The team meets with the keynote speaker in advance of the event so that the students get to provide their input to the speaker about what topics they think their peers will be most interested in hearing about, among the possible topics offered by the speaker. Committee members also host and introduce the speaker on the night of the event, plan an open networking event for the first 30 minutes of the event, help the speaker plan for the table discussions after the keynote, and sometimes manage the question and answer period at the end of the event. These responsibilities give the students an opportunity to learn and practice valuable "soft skills."

Unlike the Fall Career Networking Event, which is focused primarily on career development and includes only computing and engineering industry/government professionals in addition to the students, UMBC faculty and staff are included in Spring Into Leadership as well since the focus is on developing as leaders in these fields more broadly. Seating is assigned for this event, as opposed to the more open seating of the Fall Career Networking Event, so students will be seated with peers and at least some faculty/staff/industry professionals from their majors/areas of interest. This seating arrangement makes it more important for this event than Fall Career Networking to have a sufficient number of chemical and mechanical

engineering faculty and industry folks, which is an ongoing challenge for us. We do alternate years, having a computing-focused keynote speaker one year and an engineering-focused speaker the next.

# Cyber Practicum

# Cyber Practicum

**Logistics**

- Zero-credit/pass fail Practicum each fall and spring semester
- Required for Scholars & Associates for their first year in the program; open to other students (up to 30 total students)
- Weekly speakers who work in the field of cybersecurity

**Evaluation**

- Students turn in a short reflection paper at end of semester
- Consistently positive feedback; most common request is for more hands-on learning

**Challenges**

- Securing a variety of speakers for ~26 sessions/year
- Variety of student experience levels (difficult to direct speakers)

**Lessons Learned**

Cyber Practicum is currently in its fifteenth semester being offered to Scholars, Associates, and Affiliates. Class size has ranged from around 18-30 students, averaging around 24 students per semester. In addition to student feedback via reflection papers at the end of each semester, the number of students who choose to take Cyber Practicum when it is not required of them suggests that students find value in this course. Often, especially in the fall semesters, the class make-up is approximately half students who are required to be there and half those taking it electively. As a zero-credit Practicum run in collaboration with our university's Career Center, students get an entry on their transcript for for each semester they enroll. One student (now alumnus) took Cyber Practicum every semester of his UMBC undergraduate career and another who is currently a junior has taken it every semester but one when she had a class conflict.

Students in this Practicum are generally computer science, computer engineering, and information systems majors. In these majors, students do not get to take cybersecurity-related courses until junior and senior year. The Practicum gives students who take it as freshmen and sophomores early exposure to the field and opportunities to be introduced to topics they would not otherwise learn about in their curriculum until much later. Those who take the Practicum as juniors and seniors often have had internships and/or taken coursework that allows them to understand

the Cyber Practicum talks at a deeper level. One challenge of having a mix of student levels in the Practicum, however, is helping the speakers to understand at what level they should present their material. While we do not want everything to be over the heads of the less experienced students, we also do not want the sessions to be too basic for those with some experience. There are times when we miss the mark in either direction, but more often than not, based on student feedback, the level of technical content seems manageable for most.

Also, since the makeup of the Practicum is generally similar to that of CWIT overall (this year, 73% women and 35% URM students--higher than the general college population), and we want the  Practicum to reflect CWIT's value of inclusive excellence, we aim to recruit speakers who represent demographic diversity in similar ways to our students. This can be a challenge since the same populations that are underrepresented in computing majors at UMBC are underrepresented in the industry, so we are more successful some semesters than others at this goal.

# Industry Mentoring Program

# Industry Mentoring Program

- One year mentor match with industry professional in their chosen field
- Industry Mentoring Practicum
  - Zero-credit/pass fail Practicum each fall Required for Scholars with advanced standing
  - Topics: *career plan development*, *workplace culture and values, networking and LinkedIn, research/academic careers in tech strengths and interviewing, evaluating job offers and negotiation.*
- Evaluation
  - Post-prac evaluation sent to students; results used to improve future courses
- Challenges
  - Overrepresentation of computing professionals each year; the need for more mechanical and chemical engineers in our network.

**Lessons Learned**

The Industry Mentoring Practicum is currently in its eight year and is offered to offered to advanced standing Scholars in our Center. Class size has ranged from around 25-35 students, averaging around 30 students per semester. Based on student feedback via course evaluation at the end of each Fall, and our annual community survey, students find value in this course. As a zero-credit Practicum run in collaboration with our university's Career Center, students get an entry on their transcript for successfully completing the course. Additionally, students are assigned an industry professional with at least three years experience in a computing or engineering field who has committed to mentor them on their career plan and professional goals for the academic year. Often those serving as industry mentors to the Scholars are alumni of our program who have experienced and benefitted from the course in prior years.

Students in this Practicum attend five hour and a half long professional development sessions as part of our Industry Mentoring Program curriculum. Each year the curriculum is refined and adapted to meet the needs and priorities of the students in the program, address feedback from the prior year cohort. A sample schedule of topics from our most recent course is as follows:

1. Course Introduction, Career Checklist, and Career Plan Overview
2. Values and Workplace Culture + LinkedIn

1. Prestigious Scholarships, Research Opportunities, and Preparing for Academic Careers
2. Strengths and Interview Success
3. After the Job Offer… Negotiation Tips and Next Steps for Career Planning

Additionally, students are given in-class assignments such as collaborative career exploration exercises as well as assignments to complete outside of class such as uploading a revised resume after meeting with the UMBC Career Center or writing a reflection paper based on an information interview with their mentor.

The makeup of the  Practicum is generally similar to that of CWIT overall (this year, 73% women and 35% URM students; higher than the general college population), and we want the  Practicum to reflect CWIT's value of inclusive excellence, we aim to recruit mentors who represent demographic diversity in similar ways to our students and/or are committed to our mission. This can be a challenge since the same populations that are underrepresented in COEIT at UMBC are underrepresented in the tech industry, so we are more successful some years than others at this goal.

## IMPACT & IMPLICATIONS

- Key indicators of success:
  - Student participants who report that these programs directly led to them attaining an internship or job placement (53%).
  - Alumni of our programs return and speak on panels sharing anecdotes about how the knowledge they gained in our pre-professional programs helped them to navigate their early career experiences.
- Students see themselves as future professionals in computing and engineering, allow them to practice their networking skills, and to give them an early start at building their professional networks.
- Industry professionals, faculty/staff, and alumni who attend our events are of all genders, but many are women, which offers our students (also primarily women) the opportunity to meet potential role models in their fields.

**Impact**

Annually, after each program or course is conducted, we assess our impact via event/course evaluation surveys. We ask for feedback from both student attendees as well as professionals who volunteer to help improve the usefulness and content of the program as well as address any logistical concerns for future implementation. One key indicator of success has been the amount of student attendees who report that these events led directly to them attaining an internship or job placement. Additionally, alumni of our programs return and speak on panels sharing anecdotes about how the knowledge they gained in our pre-professional programs helped them to navigate their early career experiences. Annually, over 80% of participants in Industry Mentoring Program course rate their experience as good or excellent. Seventy-five percent of CWIT students and alumni surveyed (N=64) report that participation in our programs helped to retain them in the College and in their major and 53% report that participation in our programs directly led to them securing an internship or job offer after graduating.

**Implications**

The large Fall and Spring events are both important events for our students to help them see themselves as future professionals in computing and engineering, allow them to practice their networking skills, and to give them an early start at building their professional networks. The industry professionals, faculty/staff, and alumni who

attend our events are of all genders, but many are women, which offers our students (also primarily women) the opportunity to meet potential role models in their fields. Also, while neither of these events has recruitment as an explicit goal, several students have made connections at these events that have led to job and internship offers. The courses serve as significant sites of professionals development and career planning for diverse computing and engineering students who will soon enter the workforce equipped with tools to navigate a variety of career challenges and opportunities.

## LESSONS LEARNED: PRE-PROFESSIONAL PROGRAMS

- Strategic seating/grouping at events for aligning interests between students and professional guests
- Provide/suggest talking points and prompts for discussion to help initiate and sustain conversation at events
- Finding ways to encourage mingling beyond those participants already know
- Planning ahead for a sufficient number and high quality of industry professional guest speakers and mentors
- Increasing focus on engineering professionals who are often underrepresented at our events to ensure equity and balance of options for engineering students

**Lessons Learned**

At the Fall event we find that students want to be seated at tables with professionals whose careers exactly match the students' interests, however that is not always possible, so we have had to find ways to help students understand how they can benefit from networking with people in related, but different, fields from their own. We have also learned that it is best to provide some suggested talking points on the tables at this event to help students who are more shy, introverted, or nervous to initiate conversation.

We have learned that, without structure, the open networking at the Spring event often becomes small groups of people who already know each other interacting, so we now offer some sort of passive "game" to encourage mingling during this time.

Our Industry Mentoring  Practicum courses rely heavily on the quality and availability of the industry professionals who attend and engage at these sessions with our students. Planning early to send invitations to industry professionals and confirm them on the schedule has ensured the best variety of guests; however, year after year, we have struggled to achieve a balance of engineering and computing professionals. Computing is almost always overrepresented, which limits the experience of our engineering students.

## FUTURE DIRECTIONS/CONSIDERATIONS

- Provide programs for younger students (high school freshman and sophomores, as well as middle schoolers)
    - Develop partnerships with local schools to support this
- Expand Industry Mentoring program to Affiliate students
    - Enhance professional development support provided to students who are matched with industry mentors
- Develop a stronger community of industry professional volunteers (from past industry guest speakers and mentors) to foster greater connection to our mission and goals.
    - Host midyear check ins and events for industry professionals
    - Solicit feedback from industry professionals after they volunteer
    - Continue virtual format for courses and mentorship to allow for greater participation

**FUTURE DIRECTIONS**

Future enhancements and program directions for our pre-college programs:

- We currently have one program explicitly for high school junior girls and one primarily for high school senior girls, so we are now working to develop annual programs for younger students. We have planned a day-long program for middle school girls that we hope to pilot as soon as we are able to hold in-person events again. We are also in the process of developing a program that will be targeted at 9th and 10th grade girls. We have some contacts within local school districts to help us reach students with these events, but our school partnerships could also stand to be strengthened.

Future enhancements and program directions for our pre-professional programs:

- The Fall and Spring events are well-established programs that consistently receive positive feedback from students and professionals. We will continue these events for the foreseeable future, with small changes and tweaks each year, based on feedback from attendees.
- We have considered, but lacked the capacity, to offer industry mentors to our Affiliates in addition to our Scholars. One of the challenges to being able to do this is the availability of enough mentors to match with the number of Affiliates we have who would likely be interested in this type of program. We would also want to offer some type of ongoing professional development for any students who are matched with a mentor, so that also takes additional staff resources to

- plan and facilitate.
- COVID-19 created limitations for interactions between students and mentors as well as our in person meeting for the  Industry Mentoring course. However, the shift to virtual format has facilitated even greater engagement, especially from industry professionals, than in previous years when we asked then to join the course sessions on campus. We may continue the virtual format for courses and mentorship to allow for greater participation.

## ADAPTING THE CWIT MODEL (SUMMARY)

- Reduce costs by having high-school attendees bunk with current students in residence halls
  - Consider virtual activities such as “Escape Room” which allow for team work and fun challenges when in-person is not an option
- Utilize faculty and alumni volunteers for panels
- Coordinate with the Career Center to supplement and leverage their offering to the broader campus community
- Coordinate with the UMBC Office of Institutional Advancement (including Alumni Relations) to recruit industry mentors and corporate program sponsors.

**TRANSFERABILITY**

All of our pre-college and pre-professional initiatives are actually quite low budget programs. Because the high-school attendees bunk with current students in residence halls, we have no housing costs. The events are run by staff and students with faculty volunteers speaking on panels. We usually require three meals and snacks for each of the overnight programs and also provide some branded swag items. Escape Room (virtual) is free and currently utilizes imagination facts and Google forms so you can literally make an escape room for any topic. These are all very replicable initiatives and we will discuss tips for those who are interested.

For our large Fall and Spring events, the goal is not to replicate any existing efforts of the Career Center on campus, but to supplement what they offer with a couple of events that are tailored to our student population (underrepresented students in computing and engineering). The Career Center has been a great partner, helping to spread the word about these events to employers. Our Office of Institutional Advancement has also helped us to recruit industry mentors for the Practicum courses. This is an important consideration for anyone interested in replicating initiatives like these on campus; working in collaboration with campus partners will lead to greater success.

## WHERE TO START...

1. Clarify your goals and priorities
   a. What do you hope to gain from hosting these programs? What do you hope students will gain by attending?
   b. Choose one program (or one from each category) to begin with
2. Identify partners
   a. Recruit student leaders/committee members
   b. Admissions and anyone who works with K-12 schools/students for pre-college programs
   c. Campus career center, corporate relations/institutional advancement, and alumni relations for pre-professional programs
3. Host an event or program (series of events)
   a. Give yourself reasonable time to plan and and recruit participants for the event
   b. Be sure to solicit feedback from attendees to use to improve for next time!

- Partner with your Admissions Office to receive names and emails of high school juniors and seniors who may have an interest in your programs.
- Begin planning the single day event for all high school students. This is the least complex when it comes to event planning and working with possible minors.
  - Establish a student planning committee. During the event, connect students to the priority departments/areas.
- Create an email campaign that encourages to sign up for the event and then send bi-weekly emails about your program and the applications until the deadline.
- Establish a fall overnight program for high school seniors. This will directly increase their understanding of your programs and increase late fall application numbers.
- Establish the spring overnight program for high school juniors so they have time to take action on any knowledge and experience they gain while on your campus.
- Compliment your offerings with a Virtual Escape Room at much shorter events (1 hour) and information sessions.
  - This is a great way to have participants decompress, break the ice, or keep busy while you transition to another event segment.
- Match the skills and expertise of your staff and campus partners to the needs of your students for content; you never know who is interested and willing to serve on a panel, as a guest speaker, or volunteer networker.

# QUESTIONS

**Contact us:** https://cwit.umbc.edu/staff-profiles/