



Revolutionizing the Face
of Technology



Retain Students

An NCWIT Empower Hours Workshop

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NCWIT Lifetime Partner:



NCWIT Strategic Partners:



NCWIT Investment Partners:



Some of your students will...



Agenda

1:45-2:45

- » Strategies and NCWIT Resources
- » The Power of Data

2:45-3:45

- » Discussing Your Plans for Retention
- » NCWIT Programs and Campaigns



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Retention Research & Strategies

NCWIT Retention Resources

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Understanding Girls'/Women's Experiences in Computing Classes

- » Less programming experience, perceptions that others are better prepared
- » Gendered reaction to grades, loss of self-efficacy
- » Topics embedded in assignments and examples more relevant to males' interests
- » Standing out as different, yet isolated; constantly confronting negative stereotypes
- » Femininity as a double bind
- » Limited sense of belonging
- » Limited opportunities to develop peer relationships

Attrition of
Girls/
Women

Research: More Personally Meaningful, Greater Persistence

- » Women more likely to take additional courses when assignments are more personally meaningful
- » Meaningful and relevant assignments, examples, explanations predict intention to complete computer science major

Research: Interaction with Faculty, Peers Associated with Retention

Retention increased when faculty:

- » Perceived as caring about teaching, course content
- » Have authentic concern for students
- » Are accessible beyond the classroom
- » Encourage students

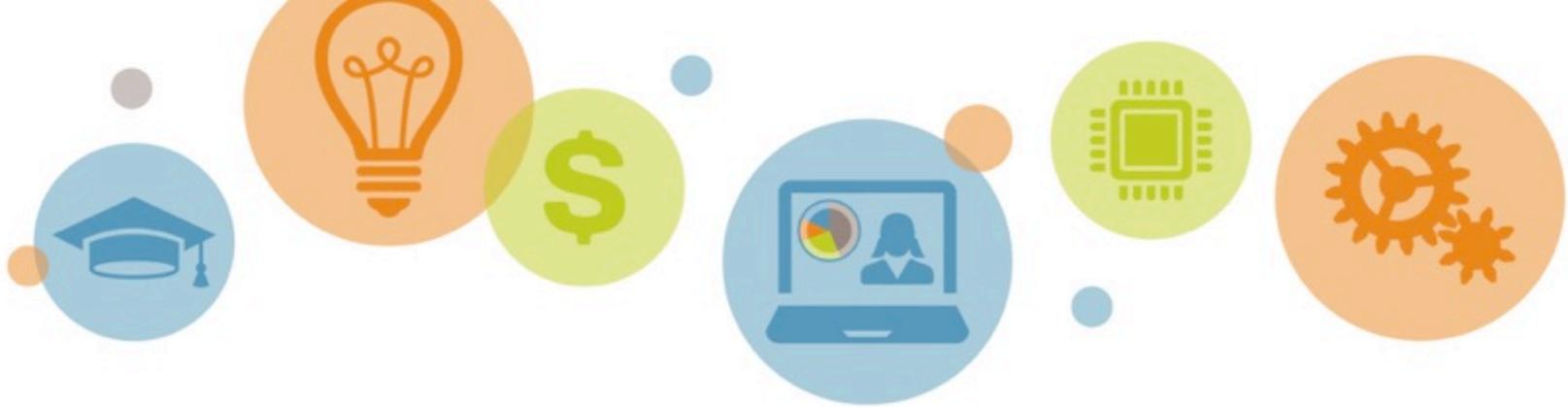
Retention predicted by support from peers

Research: Collaborative Learning Associated with Retention

- » Higher test scores and learning gains
- » Greater sense of academic community, belonging
- » Quality interaction with professors and peers
- » Student involvement
- » Enthusiasm



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Questions on Retention Research?

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Change the System, Not the Student

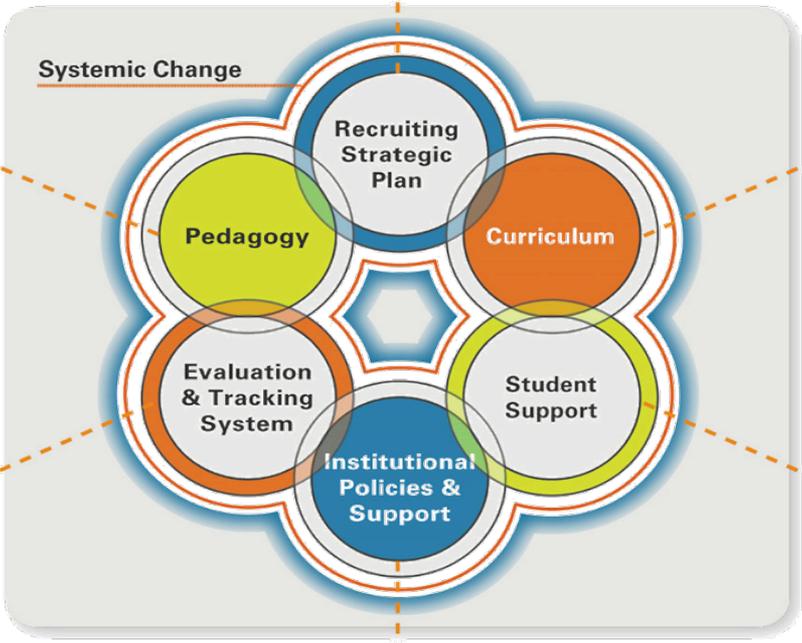
Recruit Strategically

Retain with Pedagogy

Retain with Curriculum

Assess Your Efforts

Retain with Student Support



Support Your Initiatives

Retain by Making It Meaningful

- » Connect concepts to later choices (major, graduate school, career)
- » Use examples, assignments, explanations relevant to students' life goals and interests (can survey students)
- » Course themes, tracks
- » Include a true introduction, bridge courses
- » Early hands-on design projects

National Center for Women & Information Technology
PROMISING PRACTICES

How Does Engaging Curriculum Attract Students to Computing?
with Case Study 2



Undergraduate

Retain by Promoting Community, Peer Support, Belonging, and Shared Identity

- » Collaborative learning approaches in class
- » Inclusive, comfortable climate in class
- » Set rules for professionalism
- » Shared learning in lab, discussions
- » Introduce graduate students into scholarly community

Better Approaches to Well-Intentioned, but Harmful Messages (Case Study 1)

Overcoming Stereotype Threat to Improve Retention



K-12 Education



Undergraduate



Graduate

EXPERIMENTS
BEST PRACTICE
Students often
talents, rather t
believe that inte
to drop challeng
stereotype threat

national center for

women &

INFORMATION
TECHNOLOGY

PAIR PROGRAMMING-IN-A-BOX

The Power of Collaborative Learning

ncwit.org

Many Collaborative Learning Techniques

- » Peer instruction
- » Small group problem solving in class
- » Peer-led team learning
- » Pair programming
- » “Flipped” classroom
- » Office in lab, with other grads and post-docs

The Conversational Classroom (Case Study 1)
Retaining Women through Inclusive Pedagogy



Undergraduate



Graduate

This intervention, tested and repeated at the University of Colorado with excellent results, is based on the rationale that students could read their assigned

Retain with Faculty-Student/TA-Student Interaction

- » Train teaching assistants and lab tutors
- » Encourage students and use “growth mindset”: emphasize practice
- » Give timely feedback about what grades mean
- » Intentional role modeling
- » REUs
- » “Champion” of graduate students

National Center for Women & Information Technology
PROMISING PRACTICES

Encouragement Works in Academic Settings (Case Study 1)
Increasing Persistence in Computing Through Encouragement



K-12 Education



Undergraduate



Graduate

IMPACT OF ENCOURAGEMENT

A faculty member described how simple it is for him to



EngageCSEdu

Retaining undergraduate CS students with engaging open curriculum resources for intro CS courses.

All materials employ research-based Engagement Practices

Linked to NCWIT resources & research

www.engage-csedu.org

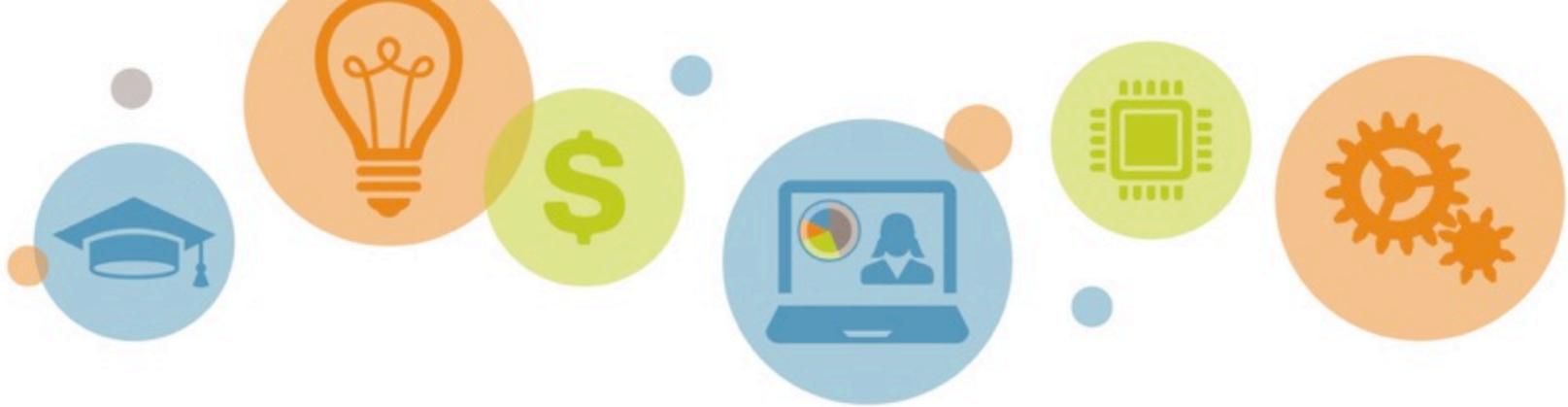
A collection of CS1/CS2 course materials to help retain & recruit diverse students

1500+ peer-reviewed course materials. . . and growing

Easy to browse & search

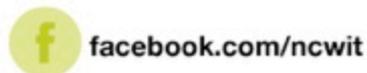


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The Power of Data: Tools for Assessment

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Collect Data to Track Results

Assess process and goal attainment

Report results

Revise

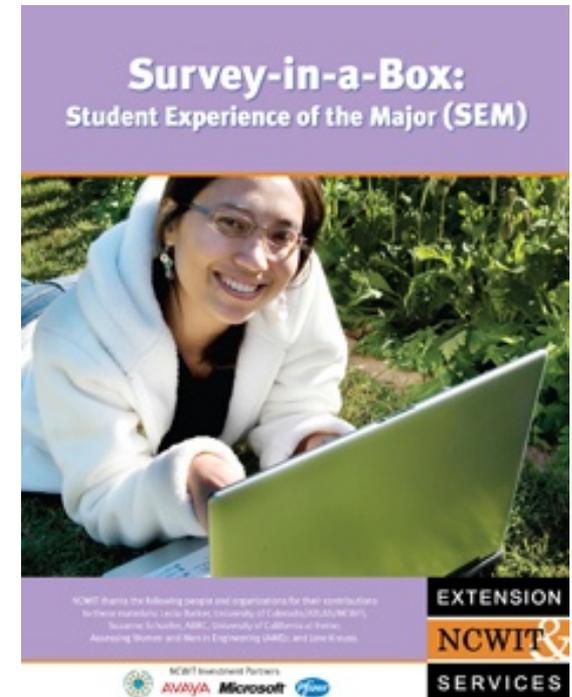
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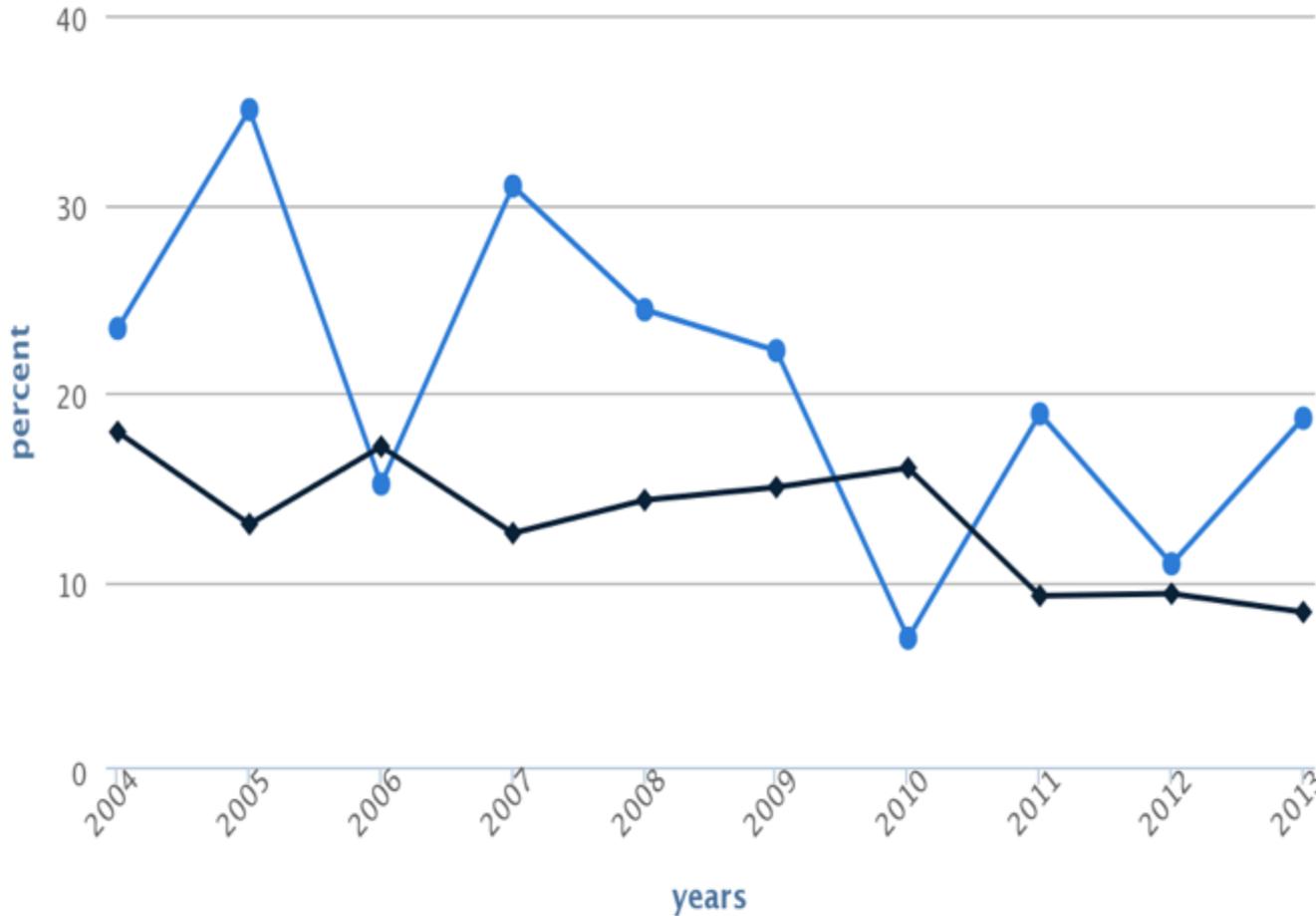
Student Experience of the Major (SEM) Survey

The SEM Survey assesses students' academic and social experiences shown to predict retention. The survey can be administered in its entirety or as individual modules that represent the 10 dimensions of student experience in the major.

- » Classroom Climate
- » Collaborative Learning
- » Faculty-Student Interaction
- » Student-Student Interaction
- » Students' Perception of Assignments and Tests
- » Pace and Workload Level
- » Student-Teaching Assistant Interaction
- » Perceived Sexism and Racism in Classes
- » Students' Commitment to the Major
- » Overall Satisfaction



Generic B University-Computer Science



Attrition Rates Female All Races/Ethnicities Attrition Rates Male All Races/Ethnicities

Highcharts.com

CUSTOMIZE CHART DATA

Data Sets

- Applicants
- Acceptances
- New Enrollments
- Attrition Rates
- Graduating Trends
- Total Declared Majors

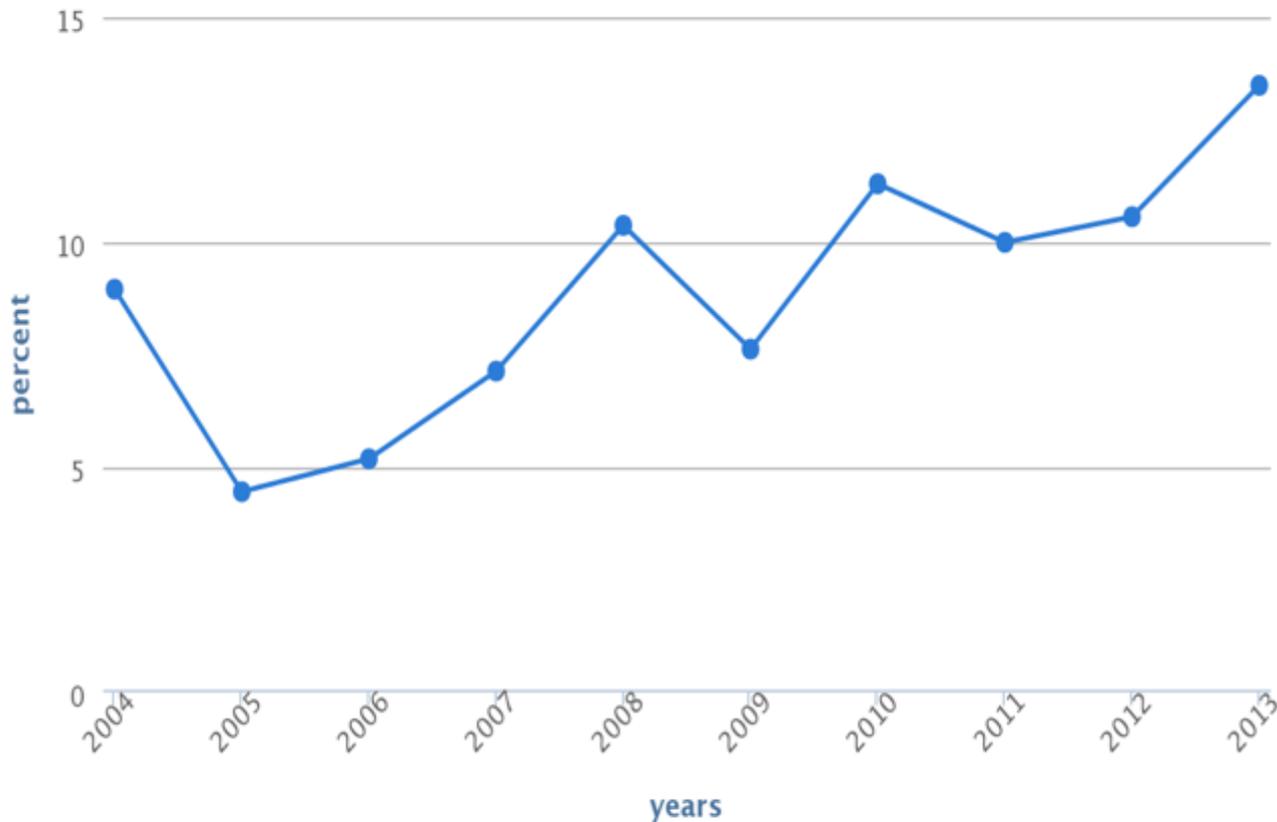
Gender

- Female
- Male

Races/Ethnicities

- All Races/Ethnicities
- Underrepresented Populations

Generic B University-Computer Science



● Graduating Trends Female All Races/Ethnicities

Highcharts.com

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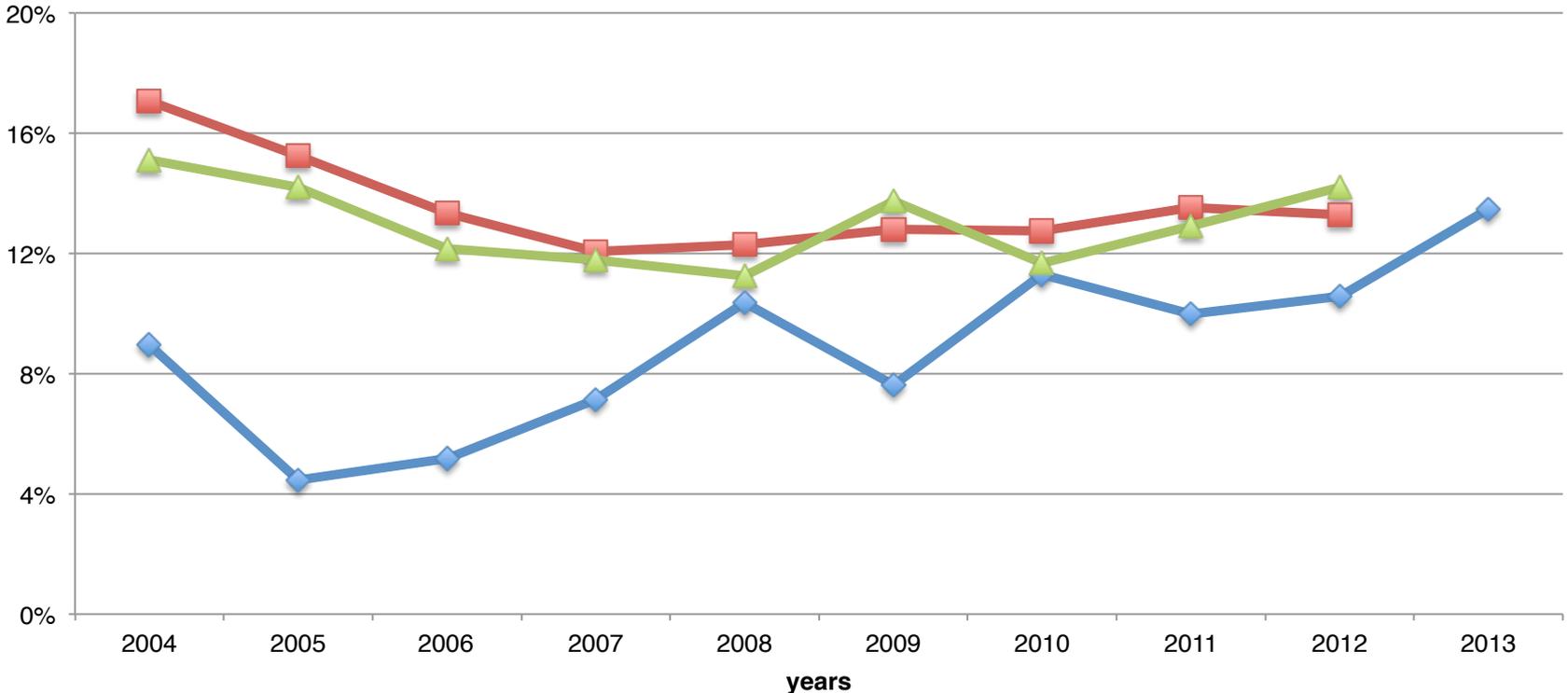
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Races/Ethnicities

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Comparisons with national data (IPEDS, Taulbee)

Generic B University-Computer Science



The years listed refer to the start of the academic year, (i.e. 2004 refers to the 2004-2005 academic year)

- ◆ Graduating Trends Female
- IPEDS (11.07) Computer Science Graduating Trends Female
- ▲ Taulbee Graduating Trends Female

Why are you taking this course?

#	Answer	Bar	Response	%
1	Required for a major in Computer Science		114	52.78%
2	Required for another major or degree (please list)		85	39.35%
3	Elective		1	0.46%
4	Interested in Computer Science		12	5.56%
5	Think the course will be helpful		1	0.46%
6	Other		3	1.39%



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What Topic Would You Like to Discuss?

Go Sit by Flip Charts

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Discussion at Tables

ncwit.org



What's next?

- Visit www.ncwit.org/ncwit2go for easy to use resource collections designed to help you achieve your goals.



Pick a second round Empower Hour to learn something new!



Aspirations in Computing

Aspirations in Computing is a sweeping national talent development initiative for young women in computing and information technology from kindergarten through graduate school.



Pacesetters

Pacesetters is a unique fast-track program where company and university leaders work together to increase their organization's number of technical women.



Extension Services Client Showcase

Extension Services provides customized consultation to computing and engineering undergraduate departments to help them develop high-impact strategies for recruiting and retaining more women students.



EngageCSEdu

EngageCSEdu is a collection of CS1 and CS2 materials that support the retention of women and other underrepresented groups in undergraduate computing education.



Sit With Me

Sit With Me invites you to validate and recognize the important role women play in creating future technology.



Male Advocacy

Learn more about the importance of male advocacy and the most effective ways men can advocate for more inclusive organizational cultures. This session is focused on industry but others are welcome to attend!!



Tapestry and C4C

Tapestry workshops prepare high school computer science teachers to attract and retain more—and more diverse—students to computing. C4C equips school counselors with information and resources they can use to guide toward education and careers in computing.



Latinas in Technology

Latinas in Technology is a campaign that brings together policy makers and leaders from education and industry to encourage Latinas and their families to consider careers in technology.