Computer Science Graduate Study and Other Careers

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REU 2019
Outline

• STEM
• Computer Science Career:
  – Employment Status
  – Outlook: Shortage of STEM worker
• Graduate Study
  – Is it for me?
  – Academic Careers and Others
  – Selecting a Program for You
  – Paying for the Graduate Program
College is the best Investment
College is the best investment

• There are 7,800 higher education institutions in the U.S.

• The Pew Research Centre finds that employed college graduates aged 25-32 earn 63% more than those with only high-school degrees.
1. STEM

• STEM stands for **Science**, **Technology**, **Engineering** and **Math** education.

• While computer science has never been a part of the actual acronym, it was thought to fall under the technology category.
On October 8th, 2015, President Obama has officially signed the STEM Education Act of 2015 into law, expanding the STEM definition to include computer science.

Officially including it in the definition signals the importance of a computer science education.
STEM Majors

- General engineering
- Aerospace engineering
- Biological engineering
- Architectural engineering
- Biomedical engineering
- Chemical engineering
- Civil engineering
- Computer engineering
- Electrical engineering
- Engineering mechanics physics and science

Engineering majors
- Environmental engineering
- Geological and geophysical engineering
- Industrial and manufacturing engineering
- Materials engineering and materials science
- Mechanical engineering
- Metallurgical engineering
- Mining and mineral engineering
- Naval architecture and marine engineering
- Nuclear engineering
- Petroleum engineering
- Miscellaneous engineering
- Engineering technologies
- Engineering and industrial management
- Electrical engineering technology
- Industrial production technologies
- Mechanical engineering related technologies
- Miscellaneous engineering technologies
- Military technologies
STEM Majors

- Animal sciences
- Food science
- Plant science and agronomy
- Soil science
- Environmental science
- Biology
- Biochemical sciences
- Botany
- Molecular biology
- Ecology

**Physical and life sciences majors**

- Genetics
- Microbiology
- Pharmacology
- Physiology
- Zoology
- Miscellaneous biology
- Nutrition sciences
- Neuroscience
- Cognitive science and biopsychology
- Physical sciences
- Astronomy and astrophysics
- Atmospheric sciences and meteorology
- Chemistry
- Geology and earth science
- Geosciences
- Oceanography
- Physics
- Nuclear, industrial radiology, and biological technologies
STEM Majors

- Computer and information systems
- Computer programming and data processing

**Computer majors**

- Computer science
- Information sciences

**Math majors**

- Mathematics
- Statistics and decision science

- Computer administration management and security
- Computer networking and telecommunications
- Mathematics and computer science
2. Computer Science Career

- Demand is high
- Supply is low
- Plenty of opportunities
NACE

• National Association of Colleges and employers (NACE)
  https://www.naceweb.org/research/reports/

• For the last three years (2016-18), computer science graduates have been the top earners among all disciplines.
## Average Salaries Class of 2018 (BS)

<table>
<thead>
<tr>
<th>BROAD CATEGORY</th>
<th>2019 SALARY PROJECTION</th>
<th>2018 SALARY PROJECTION</th>
<th>PERCENT CHANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>$69,188</td>
<td>$66,521</td>
<td>4.0%</td>
</tr>
<tr>
<td>Computer Science</td>
<td>$67,539</td>
<td>$66,005</td>
<td>2.3%</td>
</tr>
<tr>
<td>Math &amp; Sciences</td>
<td>$62,177</td>
<td>$61,867</td>
<td>0.5%</td>
</tr>
<tr>
<td>Business</td>
<td>$57,657</td>
<td>$56,720</td>
<td>1.7%</td>
</tr>
<tr>
<td>Social Sciences</td>
<td>$57,310</td>
<td>$56,689</td>
<td>1.1%</td>
</tr>
<tr>
<td>Humanities</td>
<td>$56,651</td>
<td>$56,688</td>
<td>-0.1%</td>
</tr>
</tbody>
</table>

# Average Salary by Discipline (MS)

<table>
<thead>
<tr>
<th>BROAD CATEGORY</th>
<th>2019 SALARY PROJECTION</th>
<th>2018 SALARY PROJECTION</th>
<th>PERCENT CHANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>$82,589</td>
<td>$75,481</td>
<td>9.4%</td>
</tr>
<tr>
<td>Computer Science</td>
<td>$81,466</td>
<td>$75,103</td>
<td>8.5%</td>
</tr>
<tr>
<td>Business</td>
<td>$77,347</td>
<td>$69,756</td>
<td>10.9%</td>
</tr>
<tr>
<td>Math &amp; Sciences</td>
<td>$75,737</td>
<td>$76,745</td>
<td>-1.3%</td>
</tr>
</tbody>
</table>

## Salary Differential BS & MS Degrees

<table>
<thead>
<tr>
<th>MAJOR</th>
<th>AVERAGE STARTING SALARY BY DEGREE LEVEL</th>
<th>DIFFERENTIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BS</td>
<td>MS</td>
</tr>
<tr>
<td>Business administration</td>
<td>$57,133</td>
<td>$84,580</td>
</tr>
<tr>
<td>Computer science</td>
<td>$68,103</td>
<td>$82,275</td>
</tr>
</tbody>
</table>

How about the future?

• High growth rate between 2012 and 2022 as predicted by BLS.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineers</td>
<td>1,571,900</td>
<td>1,750,300</td>
<td>178,300</td>
</tr>
<tr>
<td>Aerospace engineers</td>
<td>83,000</td>
<td>89,100</td>
<td>6,100</td>
</tr>
<tr>
<td>Biomedical engineers</td>
<td>19,400</td>
<td>24,600</td>
<td>5,200</td>
</tr>
<tr>
<td>Chemical engineers</td>
<td>33,300</td>
<td>34,800</td>
<td>1,500</td>
</tr>
<tr>
<td>Civil engineers</td>
<td>272,900</td>
<td>326,600</td>
<td>53,700</td>
</tr>
<tr>
<td>Computer hardware engineers</td>
<td>83,300</td>
<td>89,400</td>
<td>6,200</td>
</tr>
<tr>
<td>Electrical and electronics engineers</td>
<td>306,100</td>
<td>318,700</td>
<td>12,600</td>
</tr>
<tr>
<td>Environmental engineers</td>
<td>53,200</td>
<td>61,400</td>
<td>8,100</td>
</tr>
<tr>
<td>Industrial engineers</td>
<td>223,300</td>
<td>233,400</td>
<td>10,100</td>
</tr>
<tr>
<td>Mechanical engineers</td>
<td>258,100</td>
<td>269,700</td>
<td>11,600</td>
</tr>
<tr>
<td>Petroleum engineers</td>
<td>38,500</td>
<td>48,400</td>
<td>9,800</td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>------------------</td>
<td>------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td></td>
<td>Number</td>
<td>Number</td>
<td>%</td>
</tr>
<tr>
<td>Computer and information scientists, research</td>
<td>26,700</td>
<td>30,800</td>
<td>4,100</td>
</tr>
<tr>
<td>Computer and Information Systems Managers</td>
<td>332,700</td>
<td>383,600</td>
<td>50,900</td>
</tr>
<tr>
<td>Computer Hardware Engineer</td>
<td>83,300</td>
<td>89,400</td>
<td>6,200</td>
</tr>
<tr>
<td>Computer Programmers</td>
<td>343,700</td>
<td>372,100</td>
<td>28,400</td>
</tr>
<tr>
<td>Computer Support Specialists</td>
<td>722,400</td>
<td>447,800</td>
<td>155,800</td>
</tr>
<tr>
<td>All other computer specialists</td>
<td>209,300</td>
<td>845,300</td>
<td>123,000</td>
</tr>
<tr>
<td>Computer System Analysts</td>
<td>520,600</td>
<td>648,400</td>
<td>127,700</td>
</tr>
<tr>
<td>Database Administrator</td>
<td>118,700</td>
<td>136,600</td>
<td>17,900</td>
</tr>
<tr>
<td>Information Security Analysts</td>
<td>75,100</td>
<td>102,500</td>
<td>27,400</td>
</tr>
<tr>
<td>Network and Computer Systems Administrators</td>
<td>366,400</td>
<td>409,400</td>
<td>42,900</td>
</tr>
<tr>
<td>Software Developers</td>
<td>1,018,000</td>
<td>1,240,600</td>
<td>222,600</td>
</tr>
</tbody>
</table>
Job Outlook

Computer and Information Research Scientists

Percent change in employment, projected 2016-26

- Computer and information research scientists: 19%
- Computer occupations: 13%
- Total, all occupations: 7%

Note: All Occupations includes all occupations in the U.S. Economy.

Job Outlooks

Information Security Analysts

Percent change in employment, projected 2016-26

Information security analysts: 28%

Computer occupations: 13%

Total, all occupations: 7%

Note: All Occupations includes all occupations in the U.S. Economy.
Job Outlooks

Software Developers

Percent change in employment, projected 2016-26

- Software developers, applications: 31%
- Software developers: 24%
- Computer occupations: 13%
- Software developers, systems software: 11%
- Total, all occupations: 7%

Note: All Occupations includes all occupations in the U.S. Economy.
Job Outlooks

Computer Support Specialists
Percent change in employment, projected 2016-26

- Computer occupations: 13%
- Computer user support specialists: 11%
- Computer support specialists: 11%
- Computer network support specialists: 8%
- Total, all occupations: 7%

Note: All Occupations includes all occupations in the U.S. Economy.
Quiz

• Of all the degrees of all universities in the US, which one is the most valuable one?
• Name the top ten university-major pairs.

<table>
<thead>
<tr>
<th>~600</th>
<th>~100</th>
</tr>
</thead>
<tbody>
<tr>
<td>University</td>
<td>Major</td>
</tr>
</tbody>
</table>
For all degrees of all universities in the U.S., select the most valuable degrees with the highest 20-Year return. Here are the top 10 ……
Quiz

- What if my university is not Stanford or MIT (very low admission rate)?
- Will I earn a lot less if I go to a college with higher admission rate?
- Is there a difference between STEM and non-STEM fields?
Economic Value

• Economists have found that graduates of selective universities do not out-earn those who were accepted by the same colleges but chose a “lesser” institution.

• On the other hand, what you studied matters.
What Matters is…

* "It’s what you learn, not where"

American universities*, selectivity and returns

Sources: PayScale; National Centre for Education Statistics

*Sample of 240 institutions  †Based on 2012-13  ‡Returns of minus 15% or worse
Shortage in STEM/Computer Science Workforce
<table>
<thead>
<tr>
<th>Discipline</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>4492</td>
<td>5071</td>
<td>4969</td>
<td>4554</td>
<td>4187</td>
</tr>
<tr>
<td>NSM</td>
<td>5074</td>
<td>5205</td>
<td>5523</td>
<td>5790</td>
<td>6018</td>
</tr>
<tr>
<td>Tech</td>
<td>4883</td>
<td>5737</td>
<td>6356</td>
<td>6520</td>
<td>6494</td>
</tr>
<tr>
<td>Computer Science</td>
<td>792</td>
<td>870</td>
<td>1054</td>
<td>2332</td>
<td>1365</td>
</tr>
</tbody>
</table>
Figure 3. 
**Occupational Distribution of STEM Workers**
(In percent. Data based on sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see www.census.gov/acs/www/)

- Computer occupations: 50%
- Engineering occupations: 32%
- Life and physical science occupations: 12%
- Social science occupations: 4%
- Mathematical occupations: 3%

Source: U.S. Census Bureau, 2011 American Community Survey.
Figure 1: Computer occupations dominate STEM: 2018

Source: Georgetown University Center on Education and the Workforce forecast of occupational growth, 2018.
Nearly 3 out of 4 new science or engineering jobs in the U.S. are going to be in computing!
New STEM Jobs

US-BLS New U.S. STEM Jobs Through 2022 by STEM %

- Computing: 74%
- System analysis: 15%
- Software development: 32%
- Database admin.: 2%
- Support specialist: 14%
- Network/sysadmin: 7%
- Security: 3%
- Other: 1%
- Physical Sciences: 3%
- Life Sciences: 3%
- Engineering: 16%
- Mathematics: 4%

Gap

1,000,000 more jobs than students by 2020

Computer science is a top paying college degree and computer programming jobs are growing at 2X the national average.

$500 billion opportunity

1.4 million computing jobs

400,000 computer science students
Figure 1. Recent and Projected Growth in STEM and Non-STEM Employment

The Supply
New CS Students

Figure B2. Newly Declared CS/CE Undergraduate Majors

Year
Number of Students
10000 11000 12000 13000 14000 15000 16000 17000 18000 19000 20000 21000 22000 23000 24000 25000 26000
### Table D3. PhDs Awarded by Ethnicity

<table>
<thead>
<tr>
<th></th>
<th>CS</th>
<th>CE</th>
<th>I</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nonresident Alien</strong></td>
<td>840</td>
<td>132</td>
<td>43</td>
<td>1,015</td>
</tr>
<tr>
<td><strong>Amer Indian or Alaska Native</strong></td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td><strong>Asian</strong></td>
<td>136</td>
<td>14</td>
<td>15</td>
<td>165</td>
</tr>
<tr>
<td><strong>Black or African-American</strong></td>
<td>22</td>
<td>0</td>
<td>2</td>
<td>24</td>
</tr>
<tr>
<td><strong>Native Hawaiian/Pac Islander</strong></td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td><strong>White</strong></td>
<td>406</td>
<td>52</td>
<td>47</td>
<td>505</td>
</tr>
<tr>
<td><strong>Multiracial, not Hispanic</strong></td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td><strong>Hispanic, any race</strong></td>
<td>20</td>
<td>2</td>
<td>2</td>
<td>24</td>
</tr>
<tr>
<td><strong>Total Residency &amp; Ethnicity Known</strong></td>
<td>1,432</td>
<td>200</td>
<td>109</td>
<td>1,741</td>
</tr>
<tr>
<td><strong>Resident, ethnicity unknown</strong></td>
<td>106</td>
<td>16</td>
<td>2</td>
<td>124</td>
</tr>
<tr>
<td><strong>Residency unknown</strong></td>
<td>115</td>
<td>2</td>
<td>9</td>
<td>126</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td>1,653</td>
<td>218</td>
<td>120</td>
<td>1,991</td>
</tr>
</tbody>
</table>
Figure D2. Nonresident Aliens as Fraction of PhD Enrollments

CRA Taulbee Survey 2013
<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>BS</th>
<th>MS</th>
<th>PhD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonresident Alien</td>
<td>698</td>
<td>4,245</td>
<td>6,679</td>
</tr>
<tr>
<td>Amer Indian or Alaska Native</td>
<td>22</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td>Asian</td>
<td>1,545</td>
<td>556</td>
<td>648</td>
</tr>
<tr>
<td>Black or African-American</td>
<td>322</td>
<td>65</td>
<td>145</td>
</tr>
<tr>
<td>Native Hawaiian/Pac Islander</td>
<td>22</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>White</td>
<td>5,131</td>
<td>1,521</td>
<td>3,268</td>
</tr>
<tr>
<td>Multiracial, not Hispanic</td>
<td>141</td>
<td>54</td>
<td>48</td>
</tr>
<tr>
<td>Hispanic, any race</td>
<td>499</td>
<td>78</td>
<td>184</td>
</tr>
<tr>
<td>Total Residency &amp; Ethnicity Known</td>
<td>8,380</td>
<td>6,532</td>
<td>10,998</td>
</tr>
<tr>
<td>Resident, ethnicity unknown</td>
<td>498</td>
<td>246</td>
<td>514</td>
</tr>
<tr>
<td>Residency unknown</td>
<td>1898</td>
<td>427</td>
<td>735</td>
</tr>
<tr>
<td>Grand Total</td>
<td>10,776</td>
<td>7,205</td>
<td>12,247</td>
</tr>
</tbody>
</table>
Are we doing enough?

• 2014 CRA Taulbee reports (2013 data)
  – Survey includes US and Canadian PhD Granting universities
  – Majors:
    • CS: Computer Science
    • CE: Computer Engineering
    • I: Informatics
CS enrollments

https://www.nap.edu/read/24926/chapter/5#42
The third surge is coming.
MS in CS Awarded
PhD in CS Degrees awarded
Employment of CS PhDs

- **Academic**: 30.1%
- **Industry**: 63.5%
- **Government**: 3.3%
- **Self-Employed**: 1.3%
- **Other**: 1.0%
- **Unemployed**: 0.8%
What is the problem?
3. Graduate Study
The reasons vary from individual to individual and are based on many factors including, but not limited to,

- career goals,
- lifestyles,
- family commitments,
- personality, and
- financial and other constraints.
Academic Minions

Bachelor  Master  PhD  Postdoc  PI  Emeritus Prof
Advantages

• Money should not be the only reason for going to graduate school, but
  – Advanced degree results in higher salary
  – Several years of missed opportunity of earning
    • MS: 1-3 years
    • PhD: 5-8 years

• Graduate students are often adequately supported (tuition and a stipend) to attend graduate school in Computer Science.
<table>
<thead>
<tr>
<th>Program</th>
<th>Early Career</th>
<th>Mid-career</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS-BS</td>
<td>$62,900</td>
<td>$107,600</td>
</tr>
<tr>
<td>CS-MS</td>
<td>$81,200</td>
<td>$121,500</td>
</tr>
<tr>
<td>CS-DR</td>
<td>$112,000</td>
<td>$129,000</td>
</tr>
</tbody>
</table>
Time to Doctorate of Physical Sciences

Median Years

- Chemistry: 5.7 years
- Mathematics: 6.3 years
- Physics and Astronomy: 6.7 years
- Geosciences: 7.0 years
- Computer Science: 7.8 years

Other Advantages

• Challenging projects to pursue,
• Flexibility in choosing projects
• Responsibility and Satisfaction
• More credibility among peers
• Obtaining interesting jobs
• Improving your job performance
• Some jobs require an advanced degree
## Faculty Salary

### Table S1. Nine-month Salaries, 1,388 Responses of 187 US CS Departments, Percentiles from Department Averages

<table>
<thead>
<tr>
<th></th>
<th>Full Professor</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Non-Tenure Track</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In rank 16+ yrs</td>
<td>In rank 8-15 yrs</td>
<td>In rank 0-7 years</td>
<td>Years not given</td>
<td>In rank 8+ years</td>
<td>In rank 0-7 years</td>
<td>Years not given</td>
<td>Teach</td>
<td>Research</td>
<td>Postdoc</td>
<td></td>
</tr>
<tr>
<td>Depts</td>
<td>109</td>
<td>115</td>
<td>118</td>
<td>12</td>
<td>101</td>
<td>127</td>
<td>10</td>
<td>131</td>
<td>115</td>
<td>69</td>
<td>80</td>
</tr>
<tr>
<td>Indiv</td>
<td>549</td>
<td>516</td>
<td>538</td>
<td>89</td>
<td>326</td>
<td>830</td>
<td>52</td>
<td>635</td>
<td>544</td>
<td>350</td>
<td>483</td>
</tr>
<tr>
<td>10</td>
<td>$118,476</td>
<td>$118,090</td>
<td>$110,110</td>
<td>$139,090</td>
<td>$92,244</td>
<td>$94,364</td>
<td>$96,357</td>
<td>$84,048</td>
<td>$53,811</td>
<td>$59,265</td>
<td>$41,622</td>
</tr>
<tr>
<td>25</td>
<td>$133,728</td>
<td>$127,925</td>
<td>$123,301</td>
<td>$151,849</td>
<td>$97,797</td>
<td>$100,363</td>
<td>$102,366</td>
<td>$88,549</td>
<td>$59,496</td>
<td>$68,809</td>
<td>$45,865</td>
</tr>
<tr>
<td>50</td>
<td>$153,572</td>
<td>$143,086</td>
<td>$134,246</td>
<td>$159,221</td>
<td>$103,497</td>
<td>$107,447</td>
<td>$108,800</td>
<td>$94,191</td>
<td>$70,993</td>
<td>$87,395</td>
<td>$52,980</td>
</tr>
<tr>
<td>90</td>
<td>$195,935</td>
<td>$184,056</td>
<td>$164,934</td>
<td>$201,620</td>
<td>$122,738</td>
<td>$124,095</td>
<td>$161,593</td>
<td>$106,015</td>
<td>$97,500</td>
<td>$121,546</td>
<td>$68,282</td>
</tr>
</tbody>
</table>
Academic Route

Ph.D.
(5 - 7 years)
Median age at graduation: ~31

Post Doc
(2 - 10 years)

Assistant Professor
(6 years)
Not for Everyone

- Demanding, stressful, ...
- Assess your ability
- Do you enjoy doing research?
MS vs. Ph.D.

• MS Only. If you are certain that you are not interested in continuing for the Ph.D., then you should consider a “terminal” master’s program.

• MS, and then possibly a Ph.D.

• Ph.D., and possibly receiving MS along the way)

• Students applying for a master’s degree only often are not considered for financial aid.
Should I get an MS first?

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<th>Field of study</th>
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<th>Doctorate-related master's degree earned&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Non-doctorate-related masters degree earned&lt;sup&gt;a&lt;/sup&gt;</th>
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<td>RTD</td>
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<tr>
<td>Physics and astronomy</td>
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<td>6.4</td>
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Selecting a program

• Determine the area of your interests before determine the schools
• Each department may have its strength and weakness
• Possibility of changing interests
• The “right” balance between depth in one area and overall breadth is something you should try to determine.
• If you are not sure (which is okay), pick a department with some breadth.
### Table D4. Employment of New PhD Recipients By Specialty

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</table>

| Total Inside North America        | 138                     | 11                                 | 103                             | 78                   | 68                   | 61                     | 53                          | 57                              | 56                             | 37             | 24             | 123      | 51             | 51                       | 59                | 27                             | 19              | 123                 | 81     | 227  | 1,447     | 91.8%|
Other things to think about

- What are the considerations?
- Deciding where to accept
- Graduate School Application Process
## Research Expenditure

### Table R1. Total Expenditure from External Sources for Computing Research

<table>
<thead>
<tr>
<th>Department Type</th>
<th># Depts</th>
<th>10th</th>
<th>25th</th>
<th>50th</th>
<th>75th</th>
<th>90th</th>
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<tbody>
<tr>
<td>US CS Public</td>
<td>87</td>
<td>$593,406</td>
<td>$1,840,219</td>
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<tr>
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<td></td>
<td>$3,099,835</td>
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<td></td>
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<tr>
<td>US Information</td>
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<td></td>
<td>$4,416,679</td>
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<tr>
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<td>11</td>
<td>$194,548</td>
<td>$1,110,236</td>
<td>$3,595,968</td>
<td>$6,000,000</td>
<td>$6,374,580</td>
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Evaluating Graduate Programs

- Classification of Universities
- University/Department Ranking
- (Federal) Research Funding
• UH is ranked as a top tier Research University in the 2010 report.
Carnegie Foundation

• Basic Classification (Total 4,664)
  – Doctorate-Granting Universities (335, 7%)
  – Master’s Colleges and Universities (741, 16%)
  – Baccalaureate Colleges (583, 13%)
  – Baccalaureate/Associate Colleges* (408, 9%)
  – Associate’s Colleges (1,113, 24%)
  – Special Focus Institutions 2Y (444, 10%)
  – Special Focus Institutions 4Y (1,005, 22%)
  – Tribal Colleges (35, 1%)
• Doctoral University: Highest Research Activity, 108 (115 for 2015)
• Doctoral University: Higher Research Activity, 99 (105)
• Doctoral University: Moderate Research Activity, 90 (109)
In a 2013 report produced by National Science Foundation (NSF), the Computer Science research expenditures at UH ranked 49th (out of 494) in the nation during 2011.

UH’s R&D expenditure in Computer Science was about $8.7 million.

Our ranking on federally funded research expenditures ($5.8 million) is 46th in the nation.
CAE Designation

• UH has been designated the National Center of Academic Excellence in Cyber Defense Research (CAE-R) by the National Security Agency (NSA) and Department of Homeland Security (DHS).

• UH is among 60 universities that have earned such designations after passing a rigorous review of its Information Assurance Program.

• One of three Texas Universities with dual designation.
• Academic Ranking of World Universities (ARWU) published by Shanghai Jiao Tong University ranks UH’s Computer Science program 51st-75th in the world.

• In the 2014 ranking, if we count only the universities in the U.S., the ranking is 29th to 40th.
Rankings

- US News & world Report
- World University Ranking
  - [https://www.timeshighereducation.com/world-university-rankings/by-subject](https://www.timeshighereducation.com/world-university-rankings/by-subject)
- CS Rankings
  - [http://csrankings.org](http://csrankings.org)
- Academic Ranking of World Universities (ARWU)
  - [http://www.shanghairanking.com/Shanghairanking-Subject-Rankings/computer-science-engineering.html](http://www.shanghairanking.com/Shanghairanking-Subject-Rankings/computer-science-engineering.html)
Financial Support
Financial Support

• Typically graduate students are supported by
  – Teaching Assistantships
  – Research Assistantships
  – Fellowships
  – On-Campus employment

• FAFSA does not count parents’ income in cost-of-attendance (COA).
## Type of Support

### Table G1. Graduate Students Supported as Full-Time Students by Department Type

| Department Type | # Dept | On Institutional Funds | | | | On External Funds | | | | | | Total |
|-----------------|--------|-----------------------|---|---|---|-------------------|---|---|---|---|---|
|                 |        | Teaching Assistants   | Research Assistants | Full-Support Fellows | Teaching Assistants | Research Assistants | Full-Support Fellows |              |              |  |
| US CS Public    | 105    | 2,470 34.3%           | 755 10.5%           | 275 3.8%           | 10 0.1%            | 3,398 47.2%         | 298 4.1%           |              |              | 7,206 |
| US CS Private   | 36     | 597 20.2%             | 568 19.2%           | 186 6.3%           | 16 0.5%            | 1,400 47.3%         | 192 6.5%           |              |              | 2,959 |
| US CS Total     | 141    | 3,067 30.2%           | 1,323 13.0%         | 461 4.5%           | 26 0.3%            | 4,798 47.2%         | 490 4.8%           |              |              | 10,165 |
| US CE           | 9      | 58 16.6%              | 131 37.5%           | 22 6.3%            | 0 0.0%             | 134 38.4%           | 4 1.1%            |              |              | 349  |
| US I            | 10     | 162 37.7%             | 41 9.5%             | 22 5.1%            | 1 0.2%             | 194 45.1%           | 10 2.3%           |              |              | 430  |
| Canadian        | 15     | 294 31.3%             | 168 17.9%           | 93 9.9%            | 0 0.0%             | 351 37.3%           | 34 3.6%           |              |              | 940  |
| Grand Total     | 175    | 3,581 30.1%           | 1,663 14.0%         | 598 5.0%           | 27 0.2%            | 5,477 46.1%         | 538 4.5%           |              |              | 11,884 |
### Table G2. Fall 2013 Academic-Year Graduate Stipends by Department Type and Support Type

#### Teaching Assistantships

<table>
<thead>
<tr>
<th>Department Type</th>
<th># Depts</th>
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<td>97</td>
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#### Research Assistantships

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#### Full-Support Fellows

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Typical Support at UH

- Salary of ~ $1,800 per month for 9 months.
- In-state tuition for non-resident (a saving of $5,000 ~ $8,000)
- DTF waives the in-state tuition (~$3,000)
- Medical benefit ($150/mo)
Source of Financial Support

Primary source of financial support, by field of study: 2011

NSF’s Graduate Research Fellowships Program

Stephen Huang, University of Houston
Please feel free to use this presentation or modify it for your use.
GRFP

• GRFP: Graduate Research Fellowship Program
• Purpose: to help ensure the vitality and diversity of the scientific and engineering workforce in the US.
• Support: outstanding graduate students who are pursuing research-based master's and doctoral degrees in fields within NSF's mission.
• Amount of Support:
  – A stipend of $30,000/year to the fellow.
  – A cost-of-education allowance of $10,500/year to the university (will increase to $12,000/year).
  – The institution is required to exempt Fellows from paying tuition and fees normally charged to students.

• Duration: 3 years (usable over 5 years)
• Availability: 2,000 new fellowships per year
CyberCorps: Scholarships for Service (SFS)

Department of Computer Science
University of Houston
Benefits

• Scholarship awardees will receive:
  – A generous stipend
    • $30,000 per year for PhD
    • $25,000 for MS
  – All tuition and fees paid
    • Up to $9,300 for resident with summer
    • Up to $20,400 for non-resident with summer
  – Allowance for books, health insurance, travel, and other professional development
  – Participation in SFS activities such as conferences, workshops, and seminars
  – Support for summer internships and permanent jobs placement
Qualifications

• U.S. Citizen (no Permanent Residents)
• A full-time graduate student
  – MS: within 2 years of graduation
  – PhD: within 3 years of graduation
• Must focus on the study of cybersecurity
• Willing and able to work for Federal, state, local or tribal government agencies
• Recipients will work after graduation for a Federal, State, Local, or Tribal Government organization in a position related to cybersecurity for a period equal to the length of the scholarship.

• Internship and final job placements in government organizations typically require high-level security clearances and scholarship recipients are required to undergo the background investigation necessary to obtain such clearances as part of the job and/or internship application process.
Links

- CRA, http://www.cra.org
- ACM, http://www.acm.org
- http://www2.cs.uh.edu/gaann/
- National Association of Colleges and employers (NACE) https://www.naceweb.org/research/reports/