Computer Science at James Madison University

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CHOICES 2016
What is Computer Science?
What is Computer Science?

CS is **posing a problem** in such a way that a **computer** can help us **solve** it.

- Communicate
- Solve problems
- Design and imagine
- Share, store, retrieve or manipulate information
Computer Science is engineering new products

Do you want to:

Create devices that can do the work for you?

Google Glass
Computer Science is *Infrastructure and Networks*

Do you want to help:

- Keep computer systems up and running?
- Invent new ways for technologies to connect?
Computer Science is **visualizing and creating imagery**

Do you like:

- Art?
- Science?
- Game Design?
- Theater?
- Movies?
Computer Science is *information systems*

Are you someone who:

- Understands relationships?
- Likes to do things efficiently?
- Is interested in business and connecting people?
Paths to Careers

**What skills does CS require?**

Computer Science might be right for you if you have...

- Curiosity and imagination
- Flexible, creative thinking
- Work ethic – make an effort in math and science
- Communication skills in order to tackle challenges with others
What are the job prospects?
Some may think:

The tech industry is desperately trying to hire computer programmers in California.
The tech every industry is desperately trying to hire computer programmers in California everywhere
Computing Connects

Only 50% of tech jobs are at technology companies.
For instance: Are you interested in health fields?
You might want to study…

...robotics and invent digital prostheses

...computer engineering and build the next generation of laser surgical tools

...bioinformatics and design a life-saving drug
Computer Science is Computer Forensics and Cyber Security

Do you want to help:
Solve crime?
Keep us safe?
Secure information?
Computer Science is Design

Do you want to:
Make models?
Design cars, houses, fashion, anything?
The Bureau of Labor Statistics predicts 1 million open computing jobs in the U.S. by 2024. These are jobs in every industry and every state.
The value of a computer science education

$0.58M = \text{lifetime earnings of a high school graduate}^*$

$1.19M = \text{lifetime earnings of a college graduate}^*$

$1.67M = \text{lifetime earnings of a computer science major}^*$

*Net present value today

Source: Brookings
The STEM workforce problem is in computer science:

- 71% of all new jobs in STEM are in computing.
- 8% of STEM graduates are in computer science.

Sources: Bureau of Labor Statistics, National Center for Education Statistics
Where the STEM Jobs Will Be
Projected Annual Growth of NEWLY CREATED STEM Job Openings 2010-2020

Where the STEM Jobs Will Be
Degrees vs. Jobs Annually

The District of Columbia will have the highest proportion of STEM jobs as a fraction of job openings through 2018 (10%), followed by Virginia (8%).

In most states, computer occupations (computer technicians, computer programmers, and computer scientists) are the largest of STEM occupations.
What is CS like at JMU?
CS at JMU

- B.S. in CS and M.S. in CS
- 500 undergraduates, 60 graduates
- 18 CS Faculty
- Program strengths:

  Software Engineering, Computer Networking, Robotics (minor), Telecommunications (Minor), Database Systems, Information Security, Digital Forensics. Embedded systems, and more!
CS Department (Jan 2015)
Departmental Culture and Opportunities

- Student-Faculty Relationships
- Friendly Environment
- Small class sections
- Undergraduate laboratory assistants
- Undergraduates working on research grants
- Independent study with CS faculty members
- Summer Internships
- Programming Team Competitions
- CyberDefense Team Competitions
Student Support and Enrichment

- Student organizations
  - ACM Student Chapter
  - Cyber Defense Club & Team
  - Programming Team
  - Cyber Forensics Group
  - Women in Technology
  - Unix Users Group
  - Robotics Club
- UPE – CS Honor Society

- Departmental Scholarships
- TA Consultants for the introductory programming sequence
- Independent Study
- Research Projects
Scholarship Opportunities

• JMU Scholarships
  – Second Century
  – Madison Achievement
  – Dingledine Scholar

• Departmental Scholarships
  – Computer Science
  – TAG
  – FGM

• National Scholarships
  – Malcolm Lane
  – SWIFT
  – Industrial Partners

  – DoD Information Assurance
  – NSF Scholarship for Service
120 Credit Hours

53-57 hours in CS
38-40 hours GenEd
24-27 hours elective
Core Courses

- CS 139 Programming Fundamentals
- CS 159 Advanced Programming
- CS 227 Discrete Structures I
- CS 240 Algorithms and Data Structures
- CS 260 Technical Communication
- CS 261 Computer Systems I
- CS 327 Discrete Structures II
- CS 345 Software Engineering
- CS 361 Computer Systems II
- CS 430 Programming Languages
- CS 474 Database Design & Application
- MATH 220 Elementary Statistics
- MATH 235 Calculus I
Elective Courses

- CS 347 Web-Based Information Systems
- CS 349 Developing Interactive Multimedia
- CS 354 Intro to Autonomous Robotics
- CS 432 Compilers
- CS 442 Logic in Computer Science
- CS 444 Artificial Intelligence
- CS 448 Numerical Analysis
- CS 450 Operating Systems
- CS 452 Design and Analysis of Algorithms
- CS 456 Computer Architecture
- CS 457 Information Security
- CS 458 Cyber Defense
- CS 470 Parallel and Distributed Systems
Q&A with current students
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