


Accepted Students Day

Computer Science, Data Science & Information Technology

Majors at Montclair State University



Database



Remote Sensing



Image Processing

Dr. Constantine Coutras, Chair

coutrasc@mail.montclair.edu

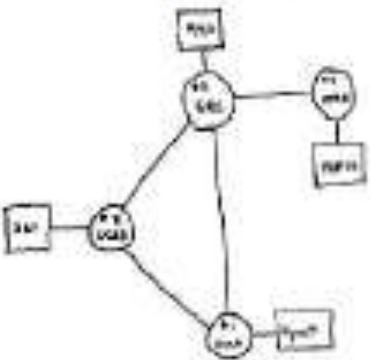


Computer Science Department 973-655-4166

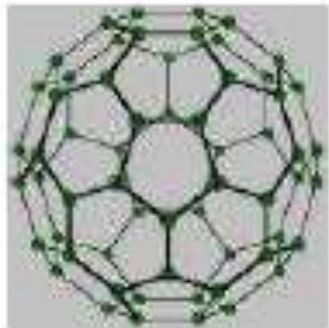
<http://cs.montclair.edu>



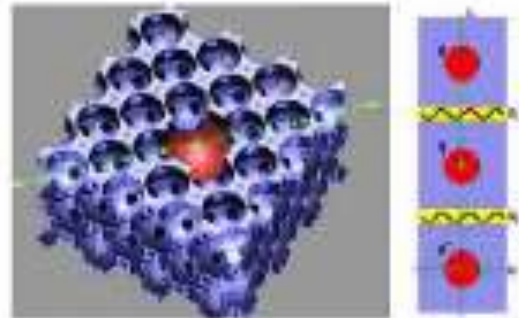
⌘ "... the software industry is going to make more breakthroughs in these next 10 years than it's made in the last 30 ... software is really going to transform not just what we think about as the computer industry, but the way that everything is done ..."



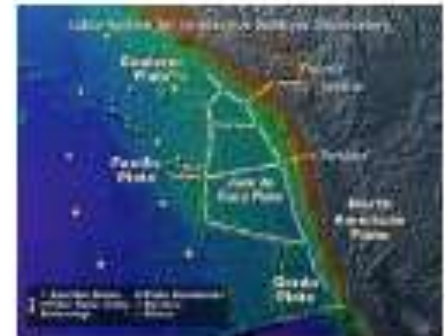
Re-architecting the Internet



Harnessing parallelism

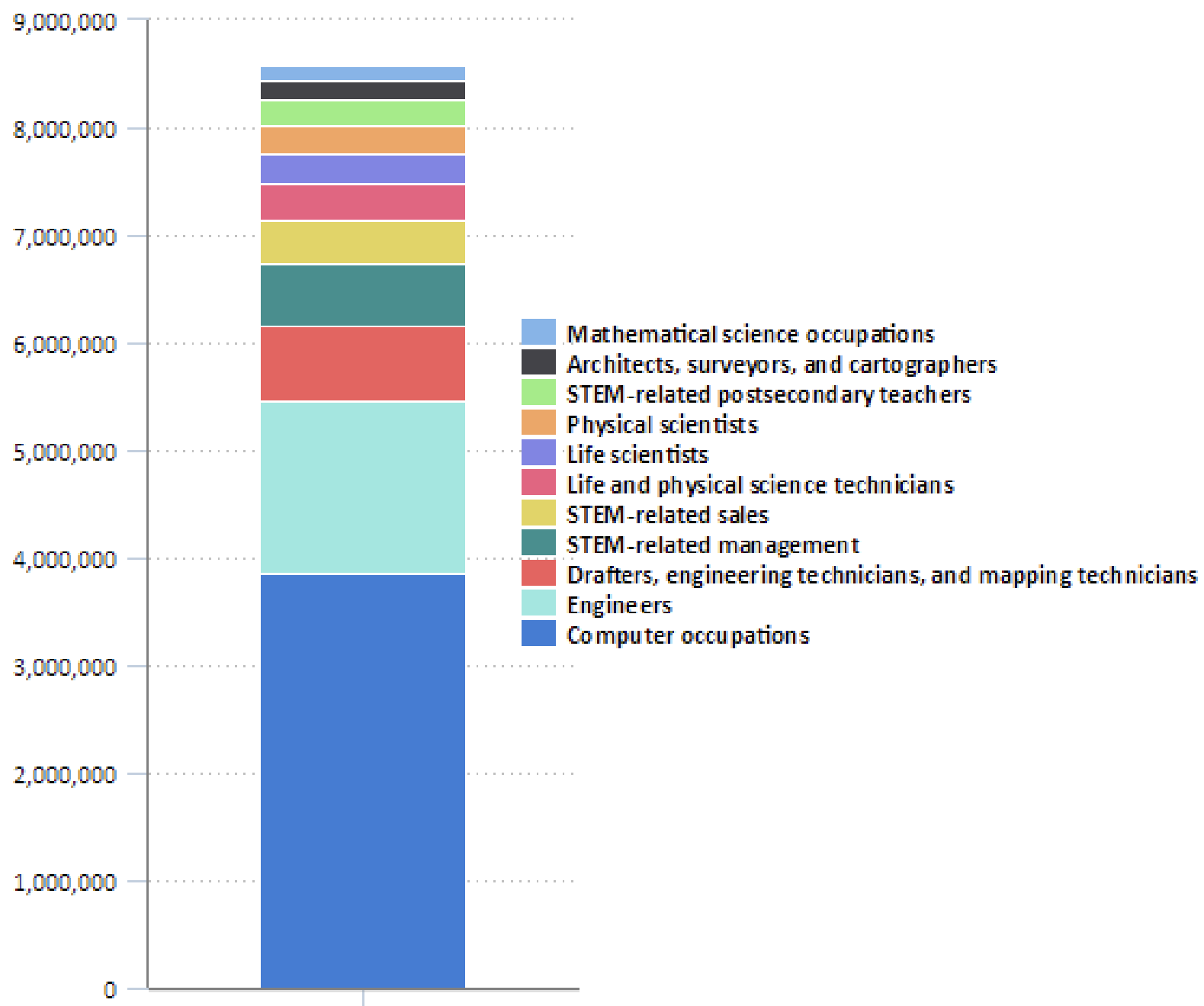


Quantum computing



Transforming all fields of science and engineering

STEM employment by type of STEM occupation, May 2015



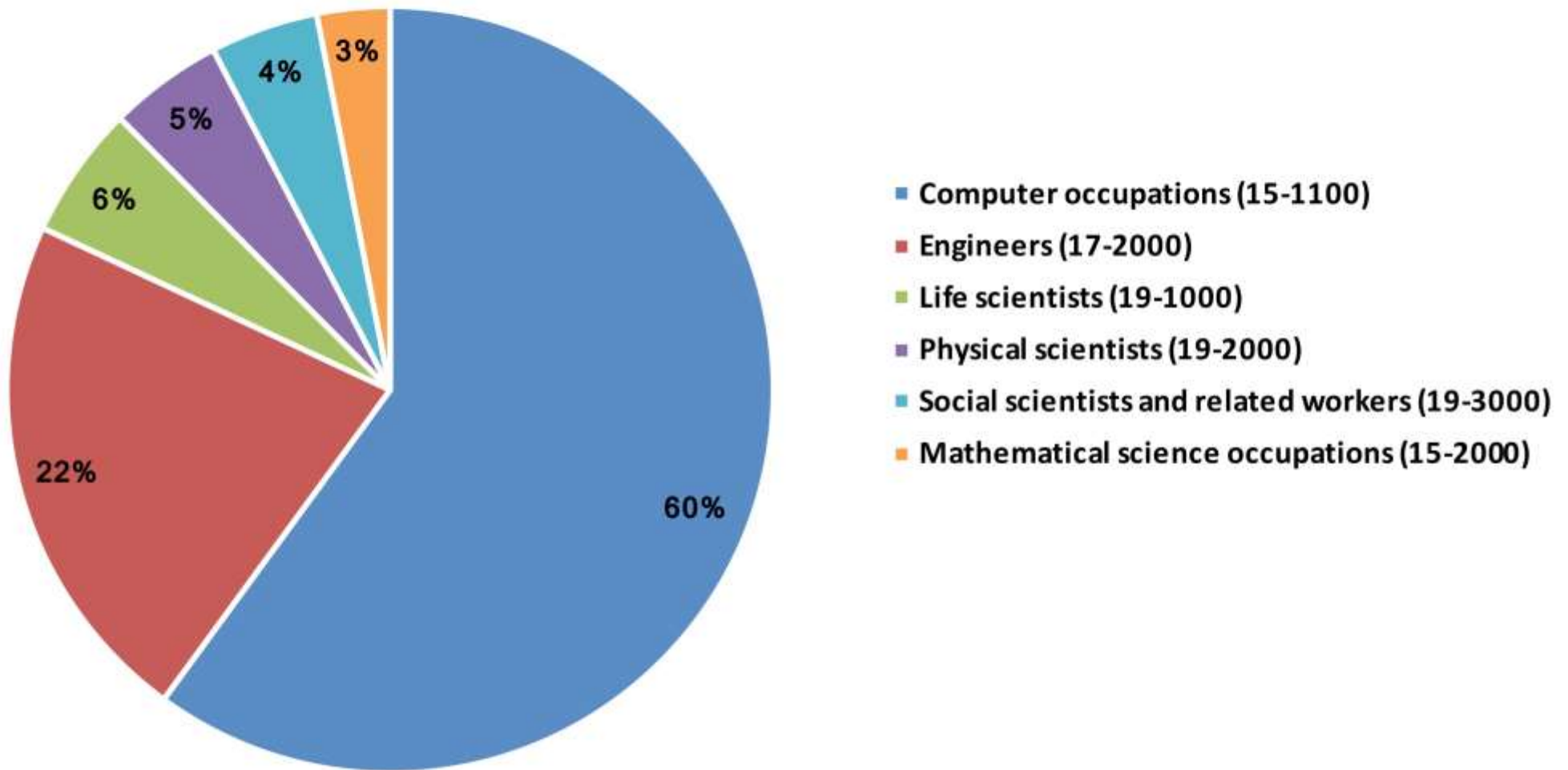
Click legend items to change data display. Hover over chart to view data.

Source: U.S. Bureau of Labor Statistics.



STEM Job Openings (Growth+Replacement), 2016-26

U.S. Bureau of Labor Statistics



Data from the spreadsheet at <https://www.bls.gov/emp/ind-occ-matrix/occupation.xlsx>

Mobile Applications

Human Computer Interaction

Network Systems Analysis

Network Administration

Computer Systems Analysis

Information Systems
Management

Data Science

**Oodles of
Opportunities**

Secure Software
Development

Cyber Security
Expert

Web Design and Development

Database Administration

Software Engineering: Systems Development

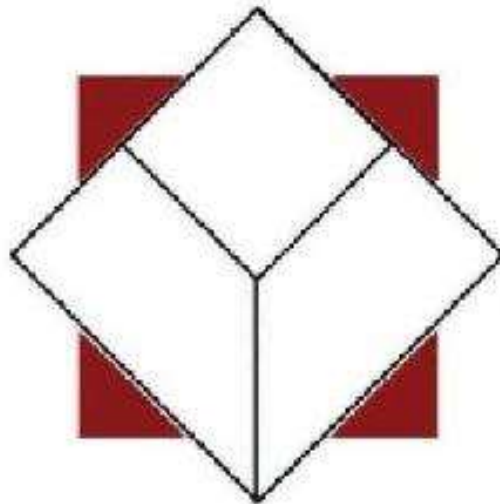
Software Quality Assurance

Software Engineering: Applications

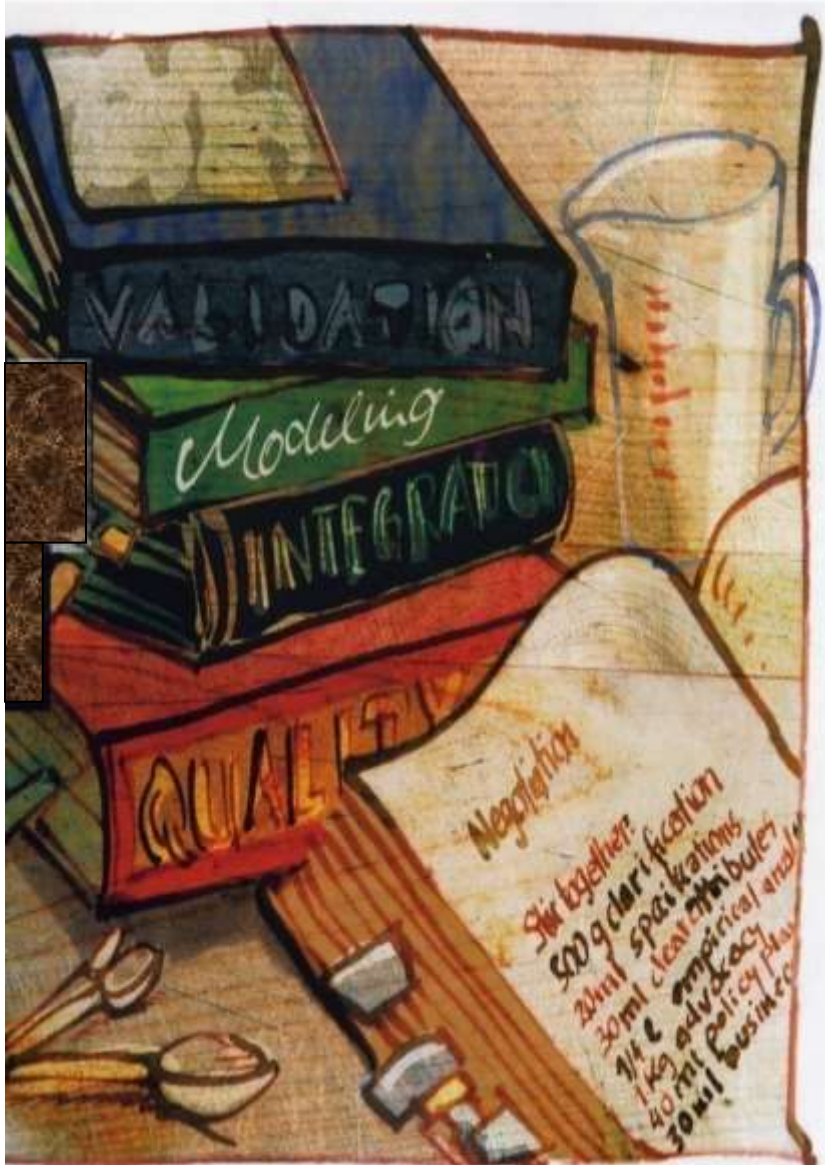
And many more...

What majors at MSU prepare students to embrace these computing opportunities?

Computer Science, Data Science & Information Technology

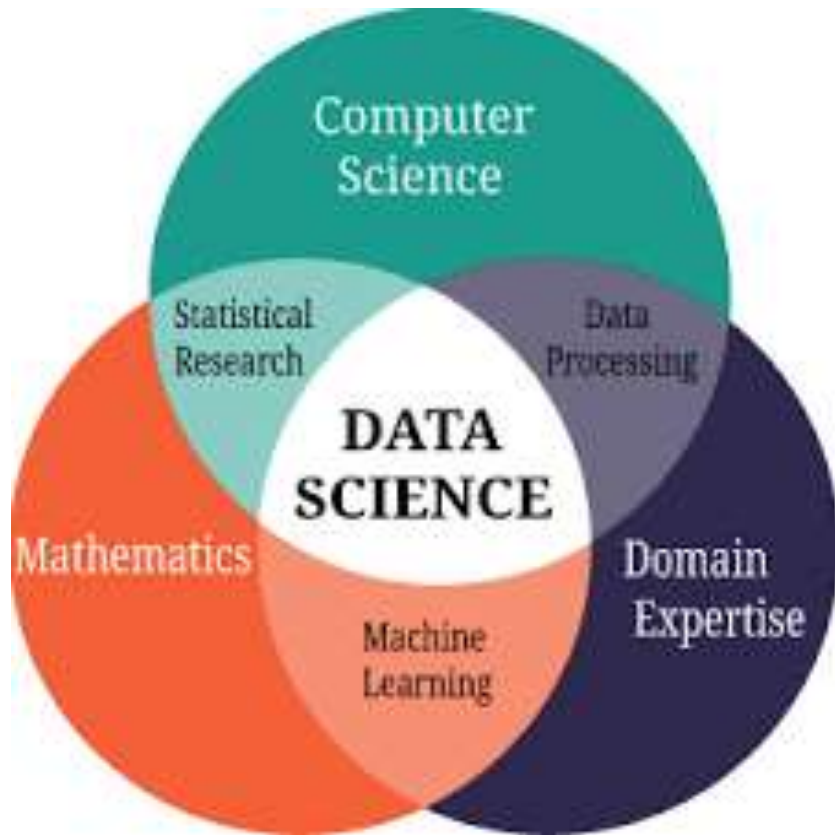


What is Computer Science?



- Building software and hardware to solve problems for people
- Applying software and hardware to solve problems
- Theory combined with practice
- Strong math foundation required

What is Data Science?



- Data science involves using automated methods to analyze massive amounts of data and to extract knowledge from them (Data Mining, Machine Learning, Business Analytics)
- Theory combined with practice
- Strong math foundation required

What is Information Technology?



- Finding and adapting software and hardware to solve problems for people
- "Gluing" existing software and hardware to solve problems
- Managing Information Systems
- Practice combined with theory
- Less rigorous math background required

Common Curriculum for CS and IT students in the first two years

- CSIT 104 Computational Concepts
- CSIT 111 Fundamentals of Programming I
- CSIT 112 Fundamentals of Programming II
- CSIT 212 Data Structures and Algorithms
- CSIT 230 Computer Systems
- CSIT 231 Systems Programming
- CSIT 270 Discrete Mathematics
- MATH 122 Calculus I or MATH 116 Calculus A
- MATH 221 Calculus II (CS only)
- MATH 235 Linear Algebra (CS Only)

Curriculum for Data Science students in the first two years

- CSIT 104 Computational Concepts
- CSIT 114 Python Programming
- CSIT 213 Data Structures and Algorithms in Python
- CSIT 230 Computer Systems
- CSIT 270 Discrete Mathematics
- CSIT 275 Introduction to R Programming
- MATH 122 Calculus I
- MATH 221 Calculus II

CS Curriculum after 2nd year

- CSIT 313 Foundations of Programming Languages
- CSIT 340 Computer Networks
- CSIT 345 Operating Systems
- CSIT 355 Database Systems
- CSIT 379 Computer Science Theory
- CSIT 460 Computer Security
- CSIT 315 Software Engineering I
- CSIT 415 Software Engineering II

IT Curriculum after 2nd year

- CSIT 335 HCI
- CSIT 337 Internet Computing
- CSIT 340 Computer Networks
- CSIT 355 Database Systems
- CSIT 432 Systems Administration
- CSIT 460 Computer Security
- CSIT 416 IT Project Management
- CSIT 491 COOP Ed : CS and IT

Data Science Curriculum after 2nd year

- CSIT 355 Database Systems
- CSIT 356 Introduction to Data Science
- CSIT 359 Data Visualization
- CSIT 440 Data Mining
- CSIT 455 Machine Learning
- CSIT 456 Advanced Techniques in Data Science
- CSIT 491 COOP **OR** CSIT 497 Undergraduate Research
- MATH 340 Probability
- STAT 330 Fundamentals of Modern Statistics

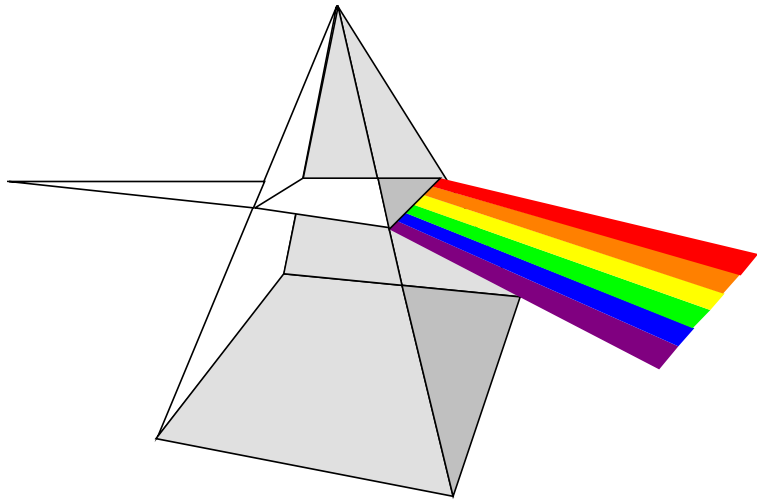
Data Science Minors

- Students chose a minor:
 - Biology, Chemistry, Physics, Earth and Environmental Science, Geographical Information Systems, Mathematics, Linguistics, Public Health, Economics, Business, Business Analytics, Journalism, Psychology, Cognitive Science

Our Classes

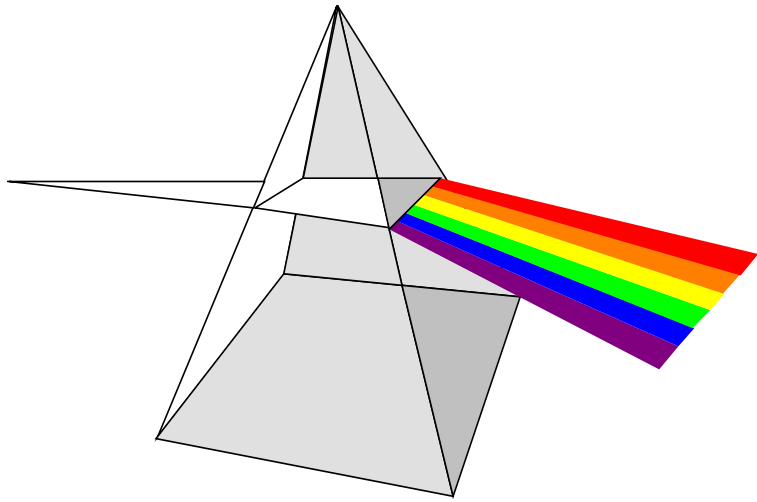


- Average class size: 25 students
- Classes taught by full-time PhD computing faculty
- Teamwork and interaction to develop communication skills
- Mobile student phones (mobile programming)
- Mediated classrooms with data projectors



Undergraduate Opportunities in CS

- Cooperative Education (academic credit in CS & IT majors, industry experience, and salary)
 - Academic credit in CS major
 - Industry experience
 - Salary from industry
 - Supervision by CS full-time faculty
- Internships



Undergraduate Opportunities in CS

- Some Cooperative Education Employers :
 - ADP, Advanced Systems Concepts, Atlantic Health Care, Canfield Scientific, Inc. , Colgate-Palmolive Global IT, Elie Tahari, Memorial Sloan-Kettering, St. Joseph's Healthcare System, Thomson Reuters, United Parcel Service, Viacom Media Networks/MTV, MSU OIT department and others

CS Department Degrees and Accreditation

- B.S. in Computer Science
- B.S. in Information Technology
- B.S. in Data Science (new)
 - Minor in Computer Science
 - Minor in Data Science (TBA)
 - Minor in Game Development (TBA)
- M.S. in Computer Science
- M.S. in Information Technology
- M.S. in Cybersecurity (Fall 2019)
- M.S. in Computational Linguistics (Fall 2019)
- M.S. in Data Science (starts in Fall 2020)

CS Department Degrees and Accreditation

- Combined BS in CS/MS in CS
 - Combined BS in CS/MS in Cybersecurity (TBA)
 - Combined BS in CS/MS in Data Science (TBA)
 - Combined BS in IT/MS in Cybersecurity (TBA)
 - Combined BS in IT/MS in Data Science (TBA)
-
- Undergraduate degree in Computer Science nationally accredited by ABET/CAC since 1992
 - In Fall 2020 we will be seeking re-accreditation of the Computer Science degree and initial accreditation of the Information Technology degree

Demographics of Computer Science Department within Montclair State University

- Populations
 - 632 BS students (doubled since Fall 2012)
 - 46 BS/MS students
 - 120 and growing MS students
- Chapter of CS National Honor Society (Upsilon Pi Epsilon)
- Student-run Computer Club

Computing Faculty at MSU

From Countries and Regions: Bangladesh, China, Greece, India, Jamaica, Romania, Taiwan, and the USA

- 21 tenure-track and tenured faculty
- 4 non-tenure track full time faculty
- Active teachers committed to student learning
- Active scholars working with students
- Publishing in national and international venues such as international IEEE and ACM
- National Science Foundation Grant Recipients