Computer Science
Is Graduate School In CS For You?
Why go to graduate school?

- Why go to graduate school?
- Why go to graduate school in CS?
- What does the CS grad program look like?
- What research opportunities exist in CS at Mines
- Apply Now!
- Questions?
Why go to graduate school?

A Chance to Learn More…
- Graduate-level classes allow you to learn about cutting-edge topics from experts in the field
- A deep, specialized education complements a broad BS degree.

A Chance to Become a Researcher…
Make a difference
- Learn about the frontiers of knowledge in your field … and expand them

Challenge yourself
- Learn how to think beyond your classes, ask important questions, provide convincing answers, communicate your ideas to others

A Chance to Interact…
Collaborate and network
- With students, postdocs, faculty members

Travel
- Research projects, visits with collaborators, workshops and conferences
Why go to graduate school?

Advanced degrees provide a competitive edge in the job market
- Higher salaries
- More-rapid advancement

Career potential
- More opportunities, more interesting jobs
- Security against outsourcing and global competition

Teaching / research assistantships can cover tuition and pay a stipend
- Yearly salary: at least $25,200
- Full tuition, fees, and health insurance coverage
- Assistantships are competitive
Doors Opened

M.S. Degree
- technical positions with additional responsibilities
- deeper, more stimulating work
- R&D positions

Ph.D. Degree
- research-oriented positions in industry
- research-oriented positions at national labs
- teaching/research positions in academia
Why go to graduate school in CS?

CS Improves our World

Top 30 Innovations of the Last 30 Years—Nightly Business Report – CS innovations comprise most of the list!

Predicting NEW jobs (2008-2018)

Jobs in Computing=Happiness

Money Magazine (Nov. 2010) – 100 Best Jobs in America

100 Best Jobs in America

Great pay and growth prospects
#1 software architect
#7 database administrator
approximately 25% in IT

10 Best Jobs in America

quality of life, low stress
#4 web developer
#5 geographic info sys. analyst
#7 test software develop. eng.
What does the CS Graduate Program Look Like?

CS Program
- 18 full-time Faculty
  8 Tenured, 5 Tenure-track, 4 Teaching + 1 Professor of Practice
- 104 Graduate Students
  74 MS degree students
  30 PhD degree students
Computer Science offers several types of graduate degrees

Master of Science, non-thesis option
- Complete 30 credit hours of coursework (or 24 credit hours of coursework and 6 credit hours of project)
- Timeline: 1 - 2 years after completion of undergraduate work

Master of Science, thesis option
- Complete 21 credit hours of coursework
- Complete 9 credit hours of thesis work
- Timeline: 1.5 – 2 years after completion of undergraduate work

Doctor of Philosophy (72 credit hours)
- Complete 36 credit hours of coursework beyond BS degree or 4-8 courses beyond MS. Main focus is Research!
- Complete minimum of 24 credit hours of thesis work
- Timeline: 4 ~ 5 years after completion of undergraduate work
- Typically supported by teaching and research assistantships
Computer Science
BS+MS Combined Degree

Combined-Degree Master’s Non-Thesis
- Best time to apply is during the Spring semester of your Junior year
- Count graduate-level coursework you complete during your senior year directly toward your MS degree.
- Count Operating Systems and Algorithms from your BS degree

Trying to finish in 1 year after you earn your UG degree?
- Complete a 6 credits toward your MS degree while earning your Bachelor’s degree *(You get to double count OS and Algorithms)*
- Take 12 credits per semester of graduate-level coursework once in grad program
- Full-time status for a graduate student is 9 credit hours
Thesis-based graduate education provides a unique learning environment

Information flows from student to faculty

Assistantships reflect value of student to a given research program

- Faculty write proposals to industry & government
- Government requests proposals to solve critical, specific problems
- If contracts are awarded, faculty hire students to conduct research
- Students address the proposed technical problems
- Students become experts on the problem under study
- Faculty and funding agency learn from students

Independent study provides skill set of great value to industry

- Research and the Scientific Method are intimately addressed
People here today

- **Presenters**
  - Bill Hoff
  - Mehmet Belviranli
  - Chuan Yue
  - Lou Brand (for Hua Wang)
  - Blake Jackson (for Tom Williams)

- **Alumni**
  - Jennifer Ryan
  - Akshay Swaminathan

- **Staff**
  - Dorothy Cheng (grad program administrator)
Research Areas

- Algorithmic Robotics
- Applied Algorithms
- Augmented Reality
- CS For All: CS Education
- Cybersecurity
- High Performance Computing
- Machine Learning
- Networked Systems
Mehmet Belviranli
Assistant Professor

YOU can do the research to solve tomorrow’s problems today with:

High Performance Computing
Research Interests:
- Heterogeneous architectures
- Runtime systems
- Performance modelling
- Autonomous computing
- Systems organization for Machine Learning

Recent Papers:
- Design, Automation & Test in Europe Conference & Exhibition (DATE’19)
- Int. Conf. for High Perf. Computing, Networking, and Analysis (SC’18)
- IEEE High Performance Extreme Computing Conference (HPEC’18)
- ACM Symposium on Principles and Practice of Parallel Prog. (PPoPP'18)
- IEEE/ACM International Symposium on Microarchitecture (MICRO’17)

More Info: belviranli@mines.edu        https://mehmet.belviranli.com
Qi Han
Professor

Research Interests
- Swarm Robotic Systems
- Internet of Things
- Mobile Crowdsourcing
- Networked Augmented Reality

Honors
- ACM Distinguished Speaker

Recent Publications
- Gerald Henderson and Qi Han, Qi Han, Distributed Learning Automata based Data Dissemination in Networked Robotic Systems, International Conference on Mobile Computing, Applications, and Service (MobiCASE), June 2019. **Best Paper Award**
- Qianru Wang, Bin Guo, Yan Liu, Qi Han, Tong Xin, Zhiwen Yu, CrowdNavi: Last-mile Outdoor Navigation for Pedestrians using Mobile CrowdSourcing, ACM International Conference on Computer-Supported Cooperative Work and Social Computing (CSCW), Jersey City, New Jersey, November 3-7, 2018
Qi Han
Professor

Coordinated Robotic Swarms

Cyber Physical Systems Approach to Improving Underground Safety

Road Traffic Prediction via Integrated Crowd-sourcing and Learning
How do humans communicate with and perceive communication by robots?

How can robots understand and generate natural language... in a way that is sensitive to their environmental, social, and moral context?
Tom Williams
Assistant Professor

Natural Language Understanding and Generation
Augmented Reality and Brain-Computer Interaction for HRI
Virtual Reality for Human-Robot Interaction

Understanding, Generating, and Encouraging Polite Human-Robot Interaction
Enabling Morally Competent Robot Communication
Robot-Astronaut Interaction that Builds Trust and Reduces Workload

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Neil T. Dantam
Assistant Professor

Research Interests
- Robot Planning and Control
- Artificial Intelligence
- Real-Time Systems

For More Information:
- dyalab.mines.edu
- ndantam@mines.edu
- BB340
Logical + Geometric Reasoning  Proactive Assistance  Action + Communication
Research Interests

- Human-Centered Robotics
- 3D Perception and Robot Adaptation
- Robot Decision Making
- Artificial Intelligence

Awards

- Amazon Picking Challenge Finalist and Travel Award, 2015
- Best Paper Award, WAIM, 2013

Publications

Hao Zhang
Assistant Professor

Assistive Robotics for Independent Living

Robot learning of human behaviors

3D object detection

Human-robot interaction

3D Mapping of Natural and Indoor Scenes

3D mapping and localization using aerial robots

Indoor map simplification for robot navigation
Dejun (DJ) Yang
Assistant Professor

Research Interests
- Networks
- Game Theory
- Mobile Sensing
- Algorithm Design

Awards
- Best Paper Awards,
  - GLOBECOM’2015
  - ICC’2012, 2011
  - MASS’2011
- Best Paper Runner-Up, ICNP’2010

Publications
- Papers: 90+
- Citations: 4200+
- H-index: 25
Join us and become the next

- Touchless Authentication
- Smartphone Theft Detection
- Speech Privacy Prevention
Dinesh Mehta
Professor

Research Interests

- Applied Algorithms and Data Structures
- Chemimformatics, Comp. Materials
- Building Energy Management

Use Better Algorithms... and Data Structures...
To Improve Performance on Difficult Problems...

Application Areas

Cheminformatics
- Molecules = labeled graphs.
- “Google for graphs” (as opposed to text)

Big data/graph analytics
- Cloud computing on hadoop/spark.
- Network analytics.
- Approximate/randomized solutions for large graphs (with Prof Bo Wu).
William Hoff
Associate Professor

Research Interests
- Augmented reality
- Computer vision
- Applications in robotics and 3D reconstruction

Publications
Sample Projects:

- Augmented reality
- 3D reconstruction
- Activity recognition
- Localization and Mapping
- People detection
- Depth image analysis

Sample Projects:

- Augmented reality
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- Depth image analysis
Tracy Camp

Research Interests
- Wireless Sensor Networks
- Applied Machine Learning
- Computer Science Education

Awards
- ACM Fellow 2012; IEEE Fellow 2016
- Mines Senior Research Award 2015
- Board of Trustees Outstanding Faculty Award 2007
- NSF Career Award and NZ Fulbright Scholar

Publications
Chuan Yue
Associate Professor

Research Interests
- Web/Mobile/Cloud/IoT/Cyber Physical/AI Systems Security
- Usable Security and Privacy
- Vulnerability Measurement & Analysis
- Cybersecurity Education

Awards
- Outstanding Paper Award, ACM CODASPY, 2018
- Best Paper Award, USENIX LISA, 2012
- Outstanding Teaching Award, 2014

Publications
Mines is designated as a National Center of Academic Excellence in Cyber Defense Education (CAE-CDE)

Please take:
CSCI 475/585: Information Security and Privacy, Fall Semester
CSCI 474/574: Introduction to Cryptography/Theory of Cryptography, Spring Semester
Other related CSCI courses
Bo Wu
Assistant Professor

Research Interests

- Parallel Computing
- Approximate Computing
- GPU Computing
- Big Graph Processing

Publications

Projects

Approximate Computing
  Problem: You have tons of data and want to make sense of them, but you have limited computing resource and time.
  Solution: Compiler and runtime solutions to produce “good enough” results. Essentially, we trade off accuracy for execution time and energy savings.

GPU Accelerating
  Problem: Your simulation/applications run very slow and you would like to see >10X speedup.
  Solution: GPUs run tens of thousands of threads to accelerate many applications tremendously. We develop advanced optimization techniques to make GPUs easy to use and efficient.
Hua Wang
Associate Professor

Research Interests
- Machine learning and Data mining
- Chemical informatics
- Bioinformatics
- Computer vision
- Medical image computing

Publications
Hua Wang
Associate Professor

Projects

Structured sparse learning

Transfer learning

Labeled source data

Assign label “grass” to the query image due to the association between feature clusters and labels by $\mathcal{S}$

Unlabeled target data

A query image
Don’t wait! Get your application in!

- Priority deadline is January 5th, 2020 to start Fall 2020
  - Enables consideration for teaching assistantship
  - Can apply after January 5th, but funding opportunities decrease

- Application requirements
  - Statement of goals & resume
  - Official transcripts (upload copy of unofficial before you submit)
  - Three letters of recommendation
    waived for Combined Degree applicants!
  - GRE requirement waived for CSM alumni

- Contact Graduate Program Manager, Dorothy Cheng for further information cheng@mines.edu
Questions?

Ask any of us questions