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WELCOME FROM THE CHAIR

It is my pleasure and privilege to write this message on behalf of the faculty, staff, students and alumni of the department of Computer Science at RIT (CS@RIT). This is the first annual report of our department. The department of computer science at RIT (CS@RIT) offers an ABET accredited 5-year BS degree in Computer Science (CS) that includes one year of mandatory co-op. The MS program in Computer Science is the largest graduate program at RIT. CS@RIT’s BS and MS programs are highly sought after by students across the US and the world - more than 12% of all RIT applicants seek Computer Science programs. Furthermore, CS@RIT attracts highly talented students despite the stiff competition from hundreds of computer science departments across the nation, including several in the North-East region. The department also offers popular combined BS/MS programs in collaboration with several other programs at RIT, and a graduate certificate course in Big Data Analytics. Our PhD program is administered within the Golisano College of Computing and Information Sciences (GCCIS). RIT’s experiential programs provide opportunities for research, professional experience, study abroad, and entrepreneurship. At any given time, the department is home to nearly 1300 students. Typically, a total of 275-300 students graduate from CS programs, each year.

Our faculty, comprising 29 tenured/tenure-track and 13 lecturers, are committed to excellence in teaching and research. 9 tenure-track faculty and 8 lecturers have joined our department in the last 5 years to boost our research profile and to provide a robust offering of courses across the discipline. This year, 4 tenure-track faculty and 2 lecturers have joined the department. In recent years, at CS@RIT we have significantly enhanced our research presence while maintaining our commitment to excellence in teaching. Many of our faculty, established and new, are actively involved in seeking funding, publishing in quality venues, and supervising BS, MS, and PhD students. Since 2017, CS faculty secured (as PI/Co-PI) nearly $2.7 M in funding through grants from the NSF, the NSA, the Sloan foundation, and other organizations, and coauthored more than 60 peer-reviewed journal and conference articles. Faculty are engaged in ongoing research activities in computing education, data science, distributed systems, graphics and visualization, artificial intelligence and pattern recognition, networking, pervasive and mobile computing, programming languages, security, and theory. The department is proud to have 4 winners of the Eisenhart Award for Outstanding Teaching.
Computer Science staff, including academic advisors contribute significantly to student success. CS Alumni network is expansive and engaged, providing the department with invaluable feedback, and support on many fronts. The department’s Advisory Board comprises members from Amazon, Apple, Cisco, Google, IBM, Intel, Microsoft, and other leading companies.

Employment rate of our BS and MS graduates is greater than 98%. Our PhD graduates have made meaningful contributions in their respective areas, and secured positions in industry and academia. Computer Science continues to be the most attractive field of study for major and minor in. Growth in enrollments poses challenges and opportunities.

We are proud of our achievements and excited by new opportunities as we aspire to be among the top computer science departments in the U.S. At CS@RIT, our vision is to make dreams come true. Be it a prospective undergraduate/graduate student or faculty/staff, we endeavor to provide the right environment to flourish.

Mohan Kumar

Professor and Chair
Computer Science Department
Rochester Institute of Technology
ABOUT THE DEPARTMENT

Overview of the Programs

**B.S. in Computer Science**

RIT established one of the first undergraduate schools of Computer Science and technology in the nation in 1972. The undergrad program in Computer Science dates back to the mid 1970s. The program was initiated while the department was in the Institute College (later changed to the College of Applied Science and Technology). The program and department were moved into the B. Thomas Golisano College of Computing and Information Sciences in 2001. The program has been ABET accredited since 1989. Currently, the BS in Computer Science is the largest undergraduate program at RIT. This program receives over 2750 applications each year; more than 12% of all applications to undergraduate programs at RIT. The BS is a 5-year comprehensive and rigorous program that includes one year of mandatory co-op. Employment rate of our graduates is more than 98%.

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<th>Fall 2017</th>
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<td>CRHs</td>
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FTE: Fulltime Equivalent; CRH: Credit hours.

**M.S. in Computer Science**

The MS in computer science is by far the most successful graduate program at RIT, attracting 800-1000 applications each year - this is nearly 18% of all applications to graduate programs at RIT. Graduation rates are more than 98% with 150-200 graduations each year. The MS program is preceded by a set of bridge courses and includes an optional co-op of up to 1 year.

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<td>CRHs</td>
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FTE: Fulltime Equivalent; CRH: Credit hours.
B.S./M.S. in Computer Science

Students have the ability to complete a joint BS/MS degree in computer science. The degree program, including 1-year mandatory co-op can be completed in 6 to 6.5 years. We also offer joint BS//MS programs with Computer Science, Software Engineering and Computer Engineering Technology.

Accreditation

The B.S. degree in Computer Science is accredited by the Computing Accreditation Commission of ABET, [http://www.abet.org](http://www.abet.org)

Program Educational Objectives

Our program educational objectives are broad statements that describe what graduates are expected to attain within a few years of graduation. Our graduates will be able to:

- Pursue advanced study in computing or participate in modern software development;
- Collaborate successfully with colleagues and clients;
- Work as ethical and responsible members of the computing profession and society.

Student Outcomes

To allow our BS graduates to meet our long-term program educational objectives, the department has developed seven student outcomes, which are more focused student outcomes used to describe what our students are expected to know and be able to do by graduation. Students graduating from our B.S. program are able to:

1. Apply the theory and principles of computer science;
2. Demonstrate fluency in high-level programming languages, environments, and tools for computing;
3. Demonstrate knowledge of the principles of computer organization, operating systems, and networks;
4. Apply computing skills and work effectively in teams in industry or research;
5. Demonstrate advanced knowledge of a selected area within the computer science discipline;
6. Prepare technical documents and make effective oral presentations; and
7. Comprehend and analyze both legal and ethical issues involving the use of computing in society.
Industrial Advisory Board

The Computer Science Industrial Advisory Board (IAB) consists of leaders from the industrial and government sectors who help the department to ensure that "real-world" concerns are incorporated into our programs. One of the primary goals of the board is to help the department to create curricula that continues to meet the changing needs of industry. The Advisory Board convenes annually with department members to share information about computer science curricula and the skills and training needed to advance the computing industries.

CS Industrial Advisory Board Members

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<tr>
<th>Name</th>
<th>Title/Position</th>
<th>Company/Institution</th>
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<tr>
<td>Bridget Beamon - Robertson</td>
<td>Senior Professional Engineer</td>
<td>The Johns Hopkins University Applied Physics Laboratory</td>
</tr>
<tr>
<td>Sean Janis</td>
<td>Engineering Manager, Mobile Shopping</td>
<td>Amazon</td>
</tr>
<tr>
<td>Tony Dal Santo</td>
<td>Senior Staff Systems Engineer</td>
<td>G2 Software Systems</td>
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<tr>
<td>Michael Kirby</td>
<td>Vice President, Embedded Hardware/Software for Controller Product Development</td>
<td>Xerox</td>
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<tr>
<td>David Cok</td>
<td>Senior Principal Consultant</td>
<td>University at Buffalo</td>
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<tr>
<td>Juli Klie</td>
<td>President</td>
<td>Veritor</td>
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<tr>
<td>David Doerman</td>
<td>Professor</td>
<td>University at Buffalo</td>
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<tr>
<td>John Marshall</td>
<td>Distinguished Engineer</td>
<td>Cisco Systems</td>
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<tr>
<td>Erik Haddad</td>
<td>UX Engineer</td>
<td>Google</td>
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<tr>
<td>Paul Monette</td>
<td>Director of Quality Engineering</td>
<td>CloudCheckr</td>
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<td>Tad Hunt</td>
<td>Product Manager</td>
<td>Google</td>
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<td>Douglas Phair</td>
<td>Technology Evangelist</td>
<td>MITRE</td>
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<tr>
<td>James Janicki</td>
<td>Business Unit Director</td>
<td>Sparton Corporation</td>
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<tr>
<td>Ajith Prabhakara</td>
<td>Manager, Product Management</td>
<td>Amazon</td>
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<tr>
<td>Aaron Rallo</td>
<td>CEO</td>
<td>TSO Logic</td>
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<tr>
<td>Mary Swift</td>
<td>Advisory NLP Software Engineer</td>
<td>IBM</td>
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<tr>
<td>Anoop Thomas</td>
<td>Senior Graphics Programmer</td>
<td>Rockstar Games</td>
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<tr>
<td>Kim Vangelder</td>
<td>Chief Information Officer and Eastman Kodak Company</td>
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<tr>
<td>Laura Weime</td>
<td>Game Developer Relations Engineer</td>
<td>Intel</td>
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<tr>
<td>Lisa Withers</td>
<td>Executive Management &amp; Consulting</td>
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Co-operative Education

Co-op is full-time paid work experience directly related to a student’s course of study and career interests. The goals of cooperative education for Computer Science students include the application of theory to real-world situations and the opportunity to work with others in a professional environment. Computer Science students show special interest and capabilities in areas requiring analytical abilities and problem-solving skills. The co-op program prepares students for software development and provides background in communication skills, professional responsibilities, and ethical behavior mandated by today’s team-oriented work environment. In addition, students gain the necessary foundation in the theoretical aspects of Computer Science so that they are well equipped to move on for advanced study.

Bachelor of Science students are required to complete a minimum of three co-op work assignments. One assignment occurs during summer and two assignments take place during semesters. Master of Science degree students optionally complete up to 12 months of co-op work assignments.

The employment outcomes for Computer Science students and graduates remain bright. RIT sponsors and supports university wide career fairs where employers and students connect. The Winter and Spring career fairs each draw around 250 employers and approximately 4000 students, leading to an average of 1500 interviews on the following day.


For more information, see https://www.rit.edu/emcs/oe/student/intro-to-co-op.
News

The following items are presented as they appeared on the Computer Science Department Website in the 2017 Academic year.

Faculty Member Awarded Grant from Cisco Systems

Dr. Minseok Kwon, Associate Professor of Computer Science, along with RIT colleagues Bruce Hartpence from the Information Sciences and Technology Department and Gahyun Park from the Department of Computer Security, recently received a corporate research grant from Cisco. The title of the project is: A length-aware cuckoo filter for packet forwarding at routers with the abstract given below.

The support is for one year with possible extensions and will involve building and testing a with Cisco UCS servers with Intel Xeon processors over 100Gbps high-speed network connections.

Abstract:

A cuckoo filter is a compact data structure for membership test allowing item deletion without filter reconstruction and extra space overhead. We will introduce a new filter called a length-aware cuckoo filter (LACF) that treats incoming IP addresses differently based on the popularity of their prefix length. Using different numbers of hash functions based on length popularity is formerly explored by length-aware Bloom filters. IP addresses of less popular prefix lengths are inserted into the filter twice, instead of once, to lower false positive rates. This reduces the false positive rates for the address of less popular prefix lengths, but does not increase the rates for the other addresses. Our analysis and preliminary numerical results show that the overall false positive rates decrease compared to the case when the original cuckoo filter is used. As proof-of-concept, we will implement LACF using Cisco’s VPP (Vector Packet Processing) library that runs on Intel’s DPDK (Data Plane Development Kit) adopted by FD.io. Our focus will be on the ip6-input node in VPP, and then extend it to the L2 input ACL. The system will be tested on both functions and performance. In the functional testing, we will verify the accuracy of forwarding results, and also measure the false positive rates. In the performance testing, we will measure forwarding table lookup time and throughput as the amount of data processed per unit time, and evaluate LACF against the latest FD.io VPP code release.
Welcome Graduate Students!
The Computer Science Department welcomed graduate students with a department-wide coffee hour Thursday, September 5 2017. The annual event is hosted by the Office of Student Services. Students gathered in the common area for a piece of cake, some cookies, coffee and tea. The coffee hour provided new students with a chance to mix and mingle with one another, as well as interact with some professors and advisors.
This year, the Department of Computer Science is proud to welcome 150 new graduate students from all over the world. “We have students from as far as Saudi Arabia to India. We even have a student from New Zealand with us this year,” said Dr. Hans-Peter Bischof, Graduate Student Coordinator.

Graduate coffee hour is hosted in room 3650 on the third-floor of the computer science building every Thursday from 1:30-2:30PM. It is open to all graduate students who are encouraged to come, unwind and enjoy a treat with their peers.

Welcome, graduate students! We wish you the best of luck as you continue on your academic journey at RIT.

Paper on providing personalized feedback in programming MOOCs to appear at ICDE 2017
Computer Science PhD student Victor J. Marin, Computer Science Master's student Tobin Pereira, Srinivas Sridharan at Stevens Institute of Technology, USA (former Computer Science PhD student), and Carlos R. Rivero will present their paper entitled "Automated Personalized Feedback in Introductory Java Programming MOOCs" in ICDE 2017, a top-tier international conference on data engineering. The conference will be held in San Diego, California this coming April. The paper describes a new technique to provide personalized feedback in introductory programming MOOCs devised at the Graph-Oriented Applications Research Lab (GOAL Lab). This
is going to be the main research focus of the GOAL Lab in the next years and the main topic of Victor J. Marin’s research.

The paper describes a semantic-aware technique for providing personalized feedback that aims to mimic an instructor looking for code snippets in student submissions. These snippets are modeled as subgraph patterns with natural language feedback attached to them. Submissions are transformed into extended program dependence graphs combining control and data flows. It leverages subgraph matching techniques to compute the adequate personalized feedback. Also, constraints correlating patterns allow performing fine-grained assessments.

RIT President Dr. David C. Munson, Jr. chatted with CS Alum Anna Sweet '04 during the San Jose stop on his Tiger Tour

Anna Sweet is an entrepreneur and innovator who is currently a business content and strategy executive for Caffeine, a live streaming platform for the gaming industry. Earlier this year, she founded Octave Nine, a tech consulting firm focused on augmented reality, virtual reality, and mixed reality. During her career, Sweet has worked at Microsoft, MySpace, Valve Corporation, Facebook, and Oculus VR.

You can hear a recorded podcast of the talk at [https://soundcloud.com/rit-alumni/tigers-talk-anna-sweet-04](https://soundcloud.com/rit-alumni/tigers-talk-anna-sweet-04). A transcript is available at [www.rit.edu/alumni/sites/rit.edu%20Transcript.pdf](http://www.rit.edu/alumni/sites/rit.edu%20Transcript.pdf)

Congratulations to Professor Zack Butler Eisenhart Award Recipient!

Professor [Zack Butler](https://www.rit.edu/academicaffairs/eisenhart/index.php) is one of the three recipients of the Eisenhart Award for Outstanding Teaching for the 2015-2016 academic year. This primary honor accorded each recipient is the campus-wide recognition of his or her outstanding teaching, celebrated in spring term and at the Academic Convocation in May. More information about this award can be found at [http://www.rit.edu/academicaffairs/eisenhart/index.php](http://www.rit.edu/academicaffairs/eisenhart/index.php). Congratulations!
Congratulations to Sean Strout (GCCIS Outstanding Educator Award) and Richard Zanibbi (GCCIS Outstanding Scholar Award)!

Each year the Golisano Computing College recognizes two faculty that exemplify excellence in student instruction and student-centered research activities within GCCIS. This year the CS Department took both awards, out of a field of over 100 faculty members in GCCIS.

Prof. Sean Strout is widely regarded as an exceptional instructor for both introductory and advanced courses in the CS program. Among his many other contributions, Prof. Strout was a key player in both the design and success of our introductory programming course sequence.

Prof. Zanibbi received the Outstanding Scholar award in recognition of his student advising, research funding, and publications in top-tier venues with his students from the Document and Pattern Recognition Lab (dprl).

Congratulations both!

RIT hosts the Northeast North America regional contest of ACM ICPC

ACM International Collegiate Programming Contest (ICPC) is a tiered world-wide programming contest, one of the oldest such contest in the world, with a long-established tradition. Teams of three students represent their university and the top teams advance from one round to the next.

RIT competes in the The Northeast North America (NENA) region which consists of colleges and universities throughout Quebec, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland, Labrador, Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut and New York State excluding New York City. Dr. Ivona Bezáková of the Department of Computer Science in GCCIS is serving as the contest director for the Northeast NA region.

The team(s) that represent the region at the World Finals are selected using a two-tier competition. The first round of the competition takes place at several preliminary sites located throughout the
region. Each Preliminary Round competition represents a different competition with different
problem sets and judges, and the results are determined independently at each site without regard
for events at the other sites. The top team(s) from this region will advance to the World Finals in
China in April of next year.

RIT not only participates in the event, but will also host the NENA regional final round which will
take place on Saturday, November 11th, 2017. Sixteen teams will compete at RIT for the
advancing spots to the World Finals.

RIT will be represented by Steven Landau, Eric Dudley, Koen Komeya, with reserve Jeet Gandhi
and RIT Coach David Narváez. The team was placed second at the preliminary round at SUNY
Oswego in October.

Teams from the following universities advanced to NENA this year and will be competing in the
final round:

1. Acadia University
2. Boston College
3. Dalhousie University
4. Harvard University
5. Massachusetts Institute of Technology
6. McGill University
7. Mount Allison University
8. Northeastern University
9. Plymouth State University
10. Rochester Institute of Technology
11. Siena College
12. St. Lawrence University
13. University of Connecticut
14. University of Massachusetts - Amherst
15. University of New Brunswick at Fredericton
16. University of Rochester

Every round of the contest has roughly the same structure: teams have access to a single computer
and get about 8 algorithmic problems that they need to solve in about 5 hours. For each problem
a sample input and output are provided but the rest of the test data is hidden. A team submits their
code and it is tested against the test data by the judges. Then a team gets back one of the following
responses: "accepted," "incorrect answer," "time limit exceeded," "runtime error", or "does not
If a code is not accepted, the team has a chance to modify the code and try again. The tricky part is that the team does not get to see the test cases on which their code failed - it is a good idea to have a balanced team with programming, algorithmic, and testing skills. The winners are determined by the number of problems solved and the time the teams took to solve the problems is used as a tie-breaker.

This year's ICPC Global Tools Sponsor is JetBrains: the creator of the leading Java IDE, IntelliJ IDEA and a vendor of world class professional software development tools. Starting from the 2018 World Finals, JetBrains will provide ICPC teams with C++, Java, and Python tools, and their modern programming language Kotlin, to help participants reach new levels of productivity, creativity, and problem-solving. The JetBrains suite of IDEs is used by over half a million students from around the world and is provided free to education to support the next generation of programmers. For more information visit [www.jetbrains.com/student](http://www.jetbrains.com/student)

The North American Contest Sponsor is Two Sigma: a technology company dedicated to finding value in the world’s data. Since its founding in 2001, Two Sigma has built an innovative platform that combines extraordinary computing power, vast amounts of information, and advanced data science to produce breakthroughs in investment management, insurance and related fields. Today, Two Sigma manages approximately $50 billion in assets, employs more than 1,200 people and has offices in New York, Hong Kong, Houston, London, and Tokyo.

More information on the contest is available at [https://icpc.baylor.edu/](https://icpc.baylor.edu/) and at [https://www.cs.rit.edu/~icpc/finals.html](https://www.cs.rit.edu/~icpc/finals.html)

**Dr. Hossein Hojjat receives a 3 year grant from the National Science Foundation**

The project is entitled “A New Approach to Federated Network Security” and as Dr. Hojjat explains, "Network operators today lack mechanisms for specifying and enforcing federated security policies. Existing approaches usually assume a single administrative domain so are unable to handle the challenges that arise in federated settings. Achieving the security guarantees typically requires cooperation and trust between multiple organizations -something that can be difficult to achieve when relying on ad-hoc mechanisms. This proposal presents a comprehensive research plan for solving these challenges using an approach based on Proof-Carrying Code (PCC). In this approach, the code provider will need to verify the code for certain safety and liveness properties, and encode the proof of this fact as a logical certificate. The code recipient will then validate the certificate using a simple, trustworthy proof checker, and only
will execute the code if the check succeeds." The grant begins in Fall 2017 and continues through summer of 2020.

Golisano College Dean’s Lecture Series Talk by Dr. Jeremy Pickens

The Computer Science Department will be hosted the Golisano College Dean's Lecture Series speaker Dr. Jeremy Pickens, chief scientist at Catalyst Repository Systems, on Friday, March 24th. Dr. Pickens's Talk took place from 1:00 - 2:00 p.m., in GOL Auditorium! His talk was entitled: “Challenges and Opportunities in eDiscovery and Information Governance: Not Everything is Big Data.”

Tangent-S Math Formula Search Engine Paper to Appear at SIGIR 2017

PhD student Kenny Davila and Dr. Richard Zanibbi from the DPRL Lab (http://www.cs.rit.edu/~dprl) had a short paper describing the Tangent-S math formula search engine accepted for poster presentation at the 40th International ACM SIGIR Conference on Research and Development in Information Retrieval in Tokyo, Japan (http://sigir.org/sigir2017). The conference received a record number of 398 short-paper submissions and accepted only 121 (30%) of them.

Tangent-S searches math formulae by appearance, semantics, or their combination. Search is performed using a three-layer model: the first layer matches formulae by pairs of symbols, the second layer re-ranks top candidates by best query formula match, and the third layer re-ranks again using linear regression over metrics for the best query formula match. Visual and semantic search results can be combined at the third layer, using the query match metrics from both representations.

For the NTCIR-12 Wikipedia Formula Browsing task benchmark, each layer increased ranking quality, with the combination of appearance and semantic representations working best. The relatively simple model used in Tangent-S produces high quality search results, and is able to search large formula collections in real-time.
UNDERGRADUATE STUDIES

First Year Computer Science

The first-year program at RIT is less about programming and more about problem solving. While students learn the basics of programming, these are done as a means to solve a problem, not an exercise in programming. The program is challenging but the rewards are fantastic. Take a look at how the first two years are structured.

Course Organization

The first-year classes consist of 3 meetings weekly. The first session is a lecture with the following sessions in the week consisting of lab exercises and a recitation.

Problem Solving: A 1-hour session that serves as an introduction to the weekly lab. This is a small group session where students are asked to answer a series of questions on pen and paper.

Lab: A 1-hour session that directly follows problem solving. Here students receive all the implementation details for the lab. Typically, there is an "in-lab" activity that students either have to individually complete early, to receive credit, or stay for the entire lab. After the completion of the in-lab portion, students get access to the entire lab, which is typically due the following week. Hand out worksheets with questions about the topic of the week. The goal is to give more practice with the material and to give some expectation about the types of questions that could be asked in exams.

CS1 (Computer Science 1: CSCI-141)

CS1 focuses on developing a better understanding of data structures and algorithms. Although this course is intended for students who do not have prior programming experience, it is recommended to start learning the basics in advance as the course moves rapidly and covers a wide range of material.

The programming language is Python (version 3). The IDE recommended for use is PyCharm IDE (https://www.jetbrains.com/pycharm/).

This course consists of weekly homework assignments, labs and a single late term project.
CS2 (Computer Science 2: CSCI-142)
This course focuses on learning the object-oriented programming paradigm. CS2 incorporates the concepts established throughout the course of CS1.

The programming language is Java (version 8). The IDE recommended for use in this class is IntelliJ (https://www.jetbrains.com/idea/).

CS for AP (CSCI-140) & CS for Transfers (CSCI-242)
The goal of this course is to provide a comprehensive experience compared to a student who has taken CS1 and CS2. Students get exposure to both Python and Java.

The early weeks will be in Python before shifting into Java for the remaining CS topics.

Other Questions
The Computer Science Department does not promote or condone any particular operating system or brands, although students have to learn some Unix basics. While laptops are not required, they do provide certain advantages. Students with laptops can use them in lab and during practical exams and have the ability to work on their assignments nearly anywhere. For all students, the Computer Science Department makes available machines in each of the labs (running Windows, MacOS and Ubuntu Linux). There is a CS mentoring center available to all students. The mentoring center is staffed with upper class student tutors who can assist with learning course material outside of class time.

Qadir Haqq
I am from Warrington, PA which is a suburban town right outside of Philadelphia. I have been interested in programming ever since I attended an old video game camp called Game Camp USA, which is where I learned my first language - Python. My interest in video games is what got me started in pursuing a career in technology, and my experience in AP Computer Science in high school sealed the deal.

My interests include video games, fitness, and hackathons. If I'm not playing video games or studying, you'll likely find me in the gym playing basketball or lifting weights.

My most proud internship moment was the release of a product that I've been able to see from start to finish during a 6-month co-op at Amplify in Brooklyn, New York. I was able to contribute to a team that started development when I joined and I was able to see it released to production during my short time as an intern there. Not many other interns are able to say that. Experiences like this have lined up a host of opportunities from companies like ASANA, Twilio, and Dropbox.

My Most proud moment outside of RIT was a project some friends and I developed for Imagine RIT 2015. The device was called ASL to Text which used the Leap Motion View Controller to track hand motion through infrared cameras and use AI to approximate text given a sign.
Undergraduate Research

Reynold Bailey, Professor of Computer Science and Undergraduate Program Coordinator, recently completed a 3-year National Science Foundation Research Experience for Undergraduates (REU) Site award, “Computational Sensing,” on which he served as coPI, alongside PI Cecilia Ovesdotter Alm, Associate Professor of English. The goal of this REU Site project is to give students experience with fundamental research in acquisition and fusion of multisource sensing data related to human beings. Students are challenged to make sense of human behaviors and cognitive processes with hardware, software, and complex thinking, exploring the nexus of computational science, scientific practice, and the human experience. Traditionally, sensors have been understood narrowly, often as physiological measurements. This project envisions sensing in broader, new ways, as time-evolving measurable data directly linked to individuals and, by extension, to their communities. With this understanding, sensing data may involve language, social network and environment signals, or emotional-creative reactions.

“REU Site: Extremal Graph Theory and Dynamical Systems" is a competitive NSF award to create research experiences for undergraduates hosted by RIT during summers. Professor Narayan from the School of Mathematical Sciences (SMS-COS) is the PI of this project, and Professor Radziszowski from CS is a co-PI, as the only member on the project’s team not from the SMS. The current award of $287,556 is funding 10 students (selected from about 150 applicants from across the US) for each of three summers to work with mentors on research projects during 8-week residence workshop on the RIT campus. The students working with Professor Radziszowski work on computational aspects of Ramsey theory. This project award was renewed already 3 times, and it is running at RIT since 2007, with the exception of only two summers. The typical outcomes of each summer are student presentations at the annual Young Mathematicians Conference and at the Joint AMS Meetings, and papers published in conference proceedings and specialized journals.
Study Abroad

The CS department has created multiple opportunities for students to continue their studies while experiencing the world from a different perspective. Although there are many study abroad options available to students at RIT, the Computer Science department programs are unique in that all participating students take computer science based coursework while abroad. We encourage you to explore both options that the department offers, and encourage all students to check out additional study abroad opportunities offered by RIT.

Dubrovnik, Croatia

The Computer science Department is currently offering a semester-long study abroad program in Dubrovnik, Croatia. Dubrovnik is the most southern city in Croatia and is a prominent tourist destination on the Adriatic Sea along the Dalmatian Coast. Students attend RIT Croatia, and carry a minimum of 12 credit hours in both Computer Science and Liberal Arts.

The program kicks off every spring semester in January and runs through the end of May. This program is open to all computing students.

Osnabrück, Germany

We also offer a semester study abroad program in Osnabrück, Germany (in affiliation with SUNY Oswego). Students attend the University of Osnabrück and carry a minimum of 12 credit hours per semester in the Cognitive Science Program and focus on Artificial Intelligence, Functional Programming, Neural Networks, and German Language and Culture. This program kicks off in the beginning of April and runs through mid-July every year. This program is open to all computing students.
Honors & Awards

ECI Systems & Engineering Scholarship

- Daniel Osváth Londoño
- Jesse Maeder
- Juasheem Sultan

Established in November of 1997 by Dr. Richard T. Cheng, current President of ECI Systems & Engineering, and former Chair of Computer Science at RIT from 1973-1976. Applicants must be majoring in Computer Science, be in at least their second year of study, demonstrate academic achievement (at least a 3.0 overall GPA and a 3.2 GPA in Computer Science Courses), and financial need. Undergraduate students only.

Kenneth and Margaret Reek Scholarship

- Alexis Holler

Established in 1999 by Ken and Margaret Reek, both alumni of RIT’s Computer Science Program and former faculty members in the Computer Science Department. The scholarship was established to assist students who might not otherwise be able to end RIT. Applicants must be majoring in Computer Science, demonstrate academic achievement (at least a 3.0 overall GPA and 3.2 GPA in Computer Science courses), and financial need. Undergraduate students only.

Carl Reynolds Computer Science Scholarship

- Cody Burrows

Established in 2008 in memory of Carl Reynolds who was a member of the faculty of RIT’s Computer Science Department from the fall of 2004 until his death in the spring of 2008. Applicants must be majoring in Computer Science and in their first year of study. The award recognizes students who demonstrates academic achievement (at least a 3.0 GPA overall and a 3.2 GPA in Computer Science courses) and who combines academic accomplishments with a willingness to help and mentor fellow students. Undergraduate students only.

Outstanding First Year Student Scholarship

- Sameen Luo

The outstanding first year student scholarship recognizes a first year Computer Science major who maintains high academic standards while also contributing positively to the culture within the Department. The award is given annually to an undergraduate student majoring in Computer Science in their first year who has earned an overall GPA 3.5 or better.
Outstanding Fifth Year Student Award

- Hunter Knepley

The outstanding fifth year student award recognizes a fifth year Computer Science student for maintaining high academic standards during his or her studies at RIT and has made significant contributions to the department. The award is given annually to a student who has maintained a 3.0 GPA or better average during his or her five years of study.

Alumni Scholarship

- Nikhil Verma

The Alumni Scholarship recognizes a Computer Science B.S. student for maintaining high academic standards (at least a 3.5 overall GPA) during their studies at RIT and who have made significant contributions to the Department. The award is made possible by generous donations from Computer Science alumni.

Student Spotlight

My name is Laurel Perweiler. I am currently a 4th year Computer Science major with a minor in Web Development and an Immersion in American Sign Language. I am from Saylorsburg, PA. I am on the New Student Orientation Leadership Team, the President of the Quidditch Club and a Computer Science Ambassador!

My first co-op was a breeze, it was everything I could have asked for and an incredible experience. When I decided to sign with different company for my second co-op, I set my expectations high. Unfortunately, I did not fit comfortably into the work environment at all. Thankfully experiencing this was very beneficial. I quickly learned where I thrive and what kind of work I would like to do after graduation. I am proud that I was still able to leave on a great note due to my hard work and making the best of a bad situation.

I am currently involved in an undergraduate research project within the Computer Science department. I am proud of this because it is something that I never saw myself doing. We are working with Computer Science 2 classes and creating an activity to see if gamifying the course work helps the students understand a specific topic better. The entire process has been very rewarding because I was able to too build an entire activity from the ground up with the freedom to use my imagination and creativity.

Something I am proud of outside of my coursework at RIT is the amount of leadership opportunities I have been able to balance on top of my classes. When I am passionate about an organization, I aim high and want to do as much as I can to help out. I started as Secretary of the Quidditch club and worked my way up, as well as beginning as an Orientation Leader and worked my way up to the highest position a student can hold! I believe my hard work for these organizations have paved the path for other students to enjoy them as much as I have.
Class of 2017

Allen, Michael Kenneth
Ansill, Thomas Brian
Anton, Vasilios Evangelos
Bannon, Dylan Reed
Bayer, Ross Michael
Benson, Clay Myles
Billings, Johnnie L.
Bond, Robert James
Booth, Valerie
Bradley, Michael Bax
Bravo, Tomas
Brown, Derek James
Bui, Winston
Carpenter, Andrew B
Carvalho, Matthew
Carvelli, Giovanni R
Chen, Stacy Jia Yan
Cheng, Yihao
Chusid, Nicholas Kent
Clotfelter, Sam Burney
Cohen, Justin Alexander
Cohen, Tal Shimon
Collins, Benjamin Scott
Condon, Michael Patrick Erickson
Connelly, Matthew Reed
Conrad, Ryan Paul
Cotton, Nathaniel Edward
Curley, Luke Jonathan
Demos, John Alexandre
Demos, Stephen
Depinet, Nicholas Leo
Dombrosky, Kevin Francis
Elgin, Thomas Wright

Fator, James B
Faucher, Jacob Andrew
Fitchett, Ian David
Flaherty, Madison Elizabeth
Fowles, Adam Christopher
Fraking, Tyler Keith
Freville, Nicholas David
Friss, Zachary Kevin
Gerstner, Estey William
Glaude, Andrew Jeffrey
Godlewski, Steven William
Gonyeo, Derek William
Hammond, William Thomas
Henderson, Chance Allen
Hilton, Nickolas J
Hilton, Zachary James
Hipkin, Kaitlin Anna
Hopkins, Kristopher Henry
Iadarola, Jeffrey Michael
Inglin, Daniel Keith
Isganitis, Kevin Edward
Jackson, Sara
Jeddeloh, Andrew S
Jenis, Nicholas George
Jennings, Kyle Wayne
Johnson Brown, Cameron Alan
Kilroy, Taylor Solms
Klei, Evan Lambertus
Knapik, Eric Matthew
Kyte, Alexander M
Lamere, Jennifer May
Lau, Lai Chung
Lax, Michael Foster
Lee, Derrick Tseng
Lee, Keenan Blair
Lee, Michael S
Lewis, Samuel R
Li, Robin
Lisnoff, Ryan Sean
Lo, Jonathan Chungwai
Lopez, Phillip Gregory
Malerba, Austin B
Marchionda, Nicholas James
Martin, Schuyler Alan
Martinez, Jesse Elias
Mazer, Eric William
McDougall, David Alton
Mccormack, Jaben Eli
Meiller, Daniel Thomas
Merrifield, Trevor Forrester
Morris, Marcus Wayne
Nash, Donald Markham
Otte, Richard Loren
Oxley, Samantha Sue
Patton, Nathan Robert
Paulsen, Tyler James
Plante, Michael Gregory
Pruitt, Michael Kincaid
Rabb, Nicholas M
Rajcan, Benjamin Micheal
Reese, Adam Pierce
Salk, Grant Alexander
Sathappan, Kartik Palaniappan
Savarese, Kyle Matthew
Scarfone, Jason Ryan
Scavone, Lucas Anthony
Schultz, Russell T
Seiden, Connor Sterling
Seita, Matthew Shoji
Short, Benjamin David
Sinclair, Daniel Lee
Smith, William Jeffery
Snook, Domenick George
Soltero, Ernesto
Sprague, Christopher Sheldon
Suwala, Dominik
Taylor, David Norry
Thu, Han Min
Tu, Jason Wesley
Vickers, Steven Edward
Ville, Joseph Marc
Watts, Josh
Weinstein, Matthew Brian
Whelton, Michael Patrick
Wight, Joshua John
Wilgenbusch, Tyler J
Ziener-Dignazio, William Michael
Zuchowski, Steven John
GRADUATE STUDIES

Areas of Study

Master’s students are required to complete a set of core classes covering programming and CS theory. After those courses are complete, students select a specialization area or *cluster* for their remaining courses, and for their project or thesis. Clusters are listed below. The combination of coursework and research in our program provides students with the skills to both engineer and advance modern computing systems.

Clusters

**Artificial Intelligence** - Algorithms and architectures needed to make decisions in complex environments, focusing on computer vision, robotics, sensor networks, data mining, document recognition and theoretical foundations.

**Computer Graphics and Visualization** - Foundations in computer graphics, including graphics programming, computer animation, virtual reality, data visualization and image synthesis.

**Data Sciences** - Data management and data discovery, focusing on design, analysis and organization of data in enterprise, multimedia, active and secure databases.

**Distributed Systems** - The interaction of systems formed by cooperating computers, including design and implementation of network protocols and security.

**Programming Languages and Tools** - The development of computer languages and the tools used to develop those languages, including compiler design, language development and emerging languages.

**Security** - Topics ranging from cryptography to secure databases including encryption techniques for data, and networking in both theoretical and applied knowledge.

**Theory** - The fundamentals of computer systems with a focus on the limits of computation, communication and cryptography and the design of systems to fit within these limits.
Graduate Research

Students in the RIT Computer Science Master's program are required to finish a Master's project or thesis to complete their degree. Faculty in the Department carry out research in a wide variety of Computer Science areas (see the Research Areas section near the back of the report).

**MS Projects** may be implementation-based, or a narrowly-focused research effort. Project students are required to take the Master’s Project Colloquium course (CSCI-788), in which students study technical writing, presentation skills, strategies for research programming, experimental design, and analysis of results. Projects culminate with a Poster presentation session and final report submitted to their advisor.

A **Master's Thesis** is a larger undertaking, normally requiring 2-3 semesters to complete. A thesis culminates with an oral presentation and defense of the thesis document to a committee of three faculty members. Successfully defended theses are archived by RIT. Often thesis students also complete an Independent Study with their advisor, to obtain sufficient time for studying background literature and identifying a research problem of interest. Master's students wishing to pursue a PhD or research-related positions in academia or industry are well-served by the additional time and technical depth that a thesis requires. A list of Master’s theses completed in 2017 may be found in the Publications section.

A number of our MS project and thesis students have published research papers, provided tools for research, and contributed to educational activities and exhibitions.

**Master's Project Best Poster Awards (2017)**

Each semester at the Master’s Project Poster Session, three posters are selected for the Best Poster award. Each award recipient is traditionally given a gift card and book by Prof. Bischof, the Master’s Program Coordinator.

**Spring 2017**

1<sup>st</sup> Bryan Justin Passino: Using Affective Computing to Determine Subject Truthfulness
Advisor: Dr. Reynold Bailey

2nd Lakshmi Ravi: Parsing Handwritten Math Formulas
Advisor: Dr. Richard Zanibbi

3rd Schuyler Alan Martin: Shoyler's Extremely Experimental Graphical Operating Library
Advisor: Prof. Warren R. Carithers

Sahil Jasrotia: iotX - Actor Model And Caching Strategies
Advisor: Dr. Peizhao Hu

1st Saurabh Chatterjee: Gale-Shapely Algorithm: Applications and Manipulations
Advisor: Dr. Hadi Hossenini

2nd Sai Ashwin Parakkal: Edge+Cloud Data Processing Framework for Internet-of-Things
Advisor: Dr. Peizhao Hu

3rd Chirag Narendra Kular: Alexa in Mixed Reality
Advisor: Dr. Reynold Bailey

My name is Krish Rohra. I am a Masters student in the Department of Computer Science at RIT. I completed my Bachelor in Information Technology from the University of Mumbai, India. My interests lie in coding, playing cricket and reading about research work in astronomy.

Through my co-op work, I was able to develop two platform level projects. I got the opportunity to present these projects to the Architect Lead of the company which were then approved and are now being used by many teams in the company. Also, the same projects are also being used in one other company.

Homomorphic Encryption being one the hot research topics, it has been a privilege to work under Prof Peizhao Hu and contribute to research on speeding up Homomorphic Encryption.
Honors & Awards

Outstanding Graduate Student Award

- Brendan John

The outstanding graduate student award recognizes a Computer Science graduate student for maintaining high academic standards (at least a 3.5 overall GPA) and for making significant contributions to the Department and the Computer Science Graduate Program.

Alumni Scholarship

- Nikhil Verma

The Alumni Scholarship recognizes a Computer Science M.S. student for maintaining high academic standards (at least a 3.5 overall GPA) during their studies at RIT, and who has made significant contributions to the Department. The award is made possible by generous donations from Computer Science alumni.

Class of 2017

Abhishek, Kumar
Advani, Aditya Ashok
Ahuja, Nishtha
Aila, Rohit
Ajgaonkar, Mitali Pradeep
Akula, Amrith Ravi
Anna Ramesh Kumar, Krishna Prasad
Annadurai, Vijay Shankar
Ansill, Thomas Brian
Atrawalkar, Shraddha Shashikant
Aziz, Kardo Othman
Babu Subramanian, Raghav
Balusu, Anusha
Bamane, Preeti Shashikant
Barve, Sharvari Upendra
Bhagat, Karan
Bhankaria, Ankit T
Bhartiya, Swati
Bhojwani, Lakhan Durgadas

Bidwalkar, Siddharth Sunil
Bindra, Sarvdeep Singh Saranjit Singh
Bulusu, Karteek Pradyumna
Byreddy, Vineeth Kumar
Carpenter, Michael John
Chandrakant Salian, Chirag
Chavan, Amruta Giridhar
Chimedia, Karan Sunil
Condon, Michael Patrick Erickson
Cotton, Nathaniel Edward
Cui, Na
Culak, Juraj
Dandekar, Apurwa Ranjit
Dayanand, Kanth Kumar
Deshkulkarni, Sourabh Subhash
Dhandapani, Srinath Kanna
Dole, Kapil M
Doshi, Amit
Dudhani, Shivkumar
Duggirala, Krishna Teja
Fernandes, Gilford Olavo
Fowles, Adam Christopher
Gala, Dhruv M
Gambhir, Rithvik
Ganta, Ashish Reddy
Gianani, Rohit Dilip
Glaude, Andrew Jeffrey
Godiawala, Krish Ketan
Gomsale, Anurag Babruwan
Gulhane, Ishan Dilip
Gunalan, Nanda Kumar
Hagawane, Ruturaj Baban
Hanagal, Madhusudan
Heinrich, Christian Alfred
Ingale, Ninad Subhash
Jackson, Sara
Jain, Chinmey Anil
Jasrotia, Sahil
Jenis, Nicholas George
Jethwani, Mohita Mukesh
Jindal, Sawan Kumar
John, Brendan Matthew
Kakkar, Himesh
Kamat, Deepali D
Kannan, Ajeeth
Kapadia, Forum Jayesh
Katkar, Ashutosh Pandit
Kearney, Sean
Khandelwal, Manish Rajendrakumar
Khodaskar, Gauri
Khubnani, Latish Haresh
Khurana, Aayushi
Klei, Evan Lambertus
Korpally, Raj Koushik Reddy
Krishnadevamaiya, Rajashree
Kulkarni, Sanika Sameer
Kumar Singh, Ravi
Lonkar, Ameya A
Lopez, Phillip Gregory
Malhotra, Gagandeep Kamaljeet
Mandhani, Manas
Mangalprabha-Deepak, Kirti
Manghnani, Vishal J
Martin, Schuyler Alan
Massicci, Ryan Michael
McGowen, Victoria Katherine
More, Vinay Vasant
Mur, Ameya Anil
Murde, Sushant Prakash
Nahar, Mansi M
Nair, Arjun
Nair, Nikita Suresh
Nayak, Ameya Keshav
Norris, Michelle Leanne
Ojha, Shivankar
Pakalapati, Chandni
Palepu, Raja Revanth
Panapakam, Kamaleeshwar
Pandit, Ashish Sanjay
Passino, Bryan Justin
Patel, Rohan Sanjay
Pathak, Swanand Sudhir
Patic, Akshata R
Patic, Chinar P
Patic, Harsh Pradip
Pereira, Tobin T
Pillai, Suhas Balkrishna
Powers, Stephen Marshall
Pragya, Poorn
My name is Tong Liu. I am currently a 5th-year PhD student in Computing and Information Science at Golisano College of Computing and Information Sciences. I am very fortunate to be advised by Dr. Christopher Homan. My research interests are utilizing human computation and machine learning techniques to study social issues in social media. Before coming to RIT, I obtained my Master’s degree in Information Science from University of Pittsburgh and Bachelor's degree in Industrial Design from Beijing University of Posts and Telecommunications in China.

My summer internships at Bosch Research and Technology Center (2016 summer) and Tencent WeChat AI Lab (2017 summer) brought me to know the real scenarios in industry that my research work could make impacts to the lives of a broad population.

I am most proud of my ability to learn quickly. When learning new concepts and skillsets that I know nothing about, I can quickly delve into them and figure out the principles and apply them to solve my problems or alleviate difficulties. When I was in college, I almost had no programming knowledge or practice. After I joined the Master of Science in Information Science program in University of Pittsburgh, I started to code, primarily on front-end development, using languages like HTML, CSS or PHP. Now I am able to build more complicated machine learning and deep learning models in my research projects. These fast learning experiences helped me make steady progress in my research career.

I have been a member of RIT Chinese Basketball Team. As a member, I enjoyed the weekly practice and game with my teammates, and I appreciate the friendships with my teammates beyond my research circle.


PhD Program

The [Golisano Computing College PhD program](#) began in Fall 2006. Since that time, the program has grown from a handful of students to well over 30. Our PhDs carry out research in both fundamental and applied Computer Science.

Our program is research-focused. Admitted PhD students have chosen their advisor prior to admission. During the first year of the program, in addition to coursework students complete their ‘comprehensive,’ which requires writing, presenting and defending a mock conference paper to the PhD faculty from across the Golisano Computing College. This requires our students to engage directly in research when they enter the program. To complete the program, they must also write and defend a thesis proposal, and their final dissertation.

Recently our PhD program was recently ranked #68 nationally in the Computer Science category by [US News](#). This is a remarkable achievement for a PhD program less than a dozen years old!

The Computing and Information Sciences PhD graduates advised by CS faculty have gone on to successful careers in industry and academia, including faculty positions at the Stevens Institute of Technology and College of the Holy Cross, postdoctoral positions (e.g., at University at Buffalo), and senior positions at corporations including Google and Appnexus.

**Graduates.** In 2017, the CS Department had two PhD students successfully defend their dissertations, [Zack Fitzsimmons](#) (advisor: Prof. Edith Hemaspaandra) and [Kenny Davila Castellanos](#) (advisor: Prof. Richard Zanibbi). Congratulations both on this important milestone!

**PhD Graduates (2017)**

![PhD Graduates](image)

**Left-to-right:** Dr. Zack Fitzsimmons, and Dr. Kenny Davila Castellanos
ALUMNI

Tristan O'Tierney

Tristan graduated with his Bachelor's degree from Computer Science in 2006. He was one of the founders of Square in 2009, with Twitter cofounder Jack Dorsey. Square makes it easier for microbusiness owners to accept credit card payments. Tristan has also worked as a Mac engineer at Yahoo, Apple, and VMware and created the official Obama 2008 iPhone app. He built one of the first Twitter client apps on the App Store, Twinkle, while working as an iOS developer for video game company Tapulous. He's also well known for his online Objective-C tutorial and enjoys hacking on projects like FlickrBooth in his spare time.

Kurt Kluever

Kurt graduated with both his Bachelor's and Master's degrees from Computer Science in 2008. He currently is a Software Engineer at Google in New York City, NY where he specializes in backend infrastructure, Google+, and Java Core Libraries. Kurt joined Google in 2008 after having been on co-op with Google in San Francisco, CA during his CS undergraduate program.

Paul Solt

Paul graduated with both his Bachelor's and Master's degrees from Computer Science in 2010. He runs a development studio called Artwork Evolution. They design photo apps, entertainment apps, and games for iPhone, iPad, and Mac. Paul has taught iPhone programming as an Adjunct Professor at Rochester Institute of Technology (RIT) and teaches popular online courses through iPhoneDev.tv, Skillshare.com, and Udemy.com. Paul's work experience includes Apple and Microsoft, where he worked in computer graphics and on mobile teams.
FACULTY AND STAFF

Faculty

Dr. Reynold Bailey
Professor and Undergraduate Program Coordinator

Dr. Ivona Bezáková
Professor

Dr. Hans-Peter Bischof
Professor and Graduate Program Director

T.J. Borrelli
Senior Lecturer

Jeremy Brown
Lecturer

Dr. Zack Butler
Associate Chair, Professor and Associate Graduate Coordinator

Warren R. Carithers
Associate Professor

Dr. Taejoong “Tijay” Chung
Assistant Professor

Dr. Aaron Deever
Senior Lecturer and Associate Undergraduate Program Coordinator

Henry A. Etlinger
Emeritus Associate Professor

Dr. Matthew Fluet
Associate Professor

Dr. Joe Geigel
Professor
Dr. Leon Reznik  
Professor

Dr. Carlos Rivero  
Assistant Professor

Dr. Carol Romanowski  
Professor

Ben K. Steele  
Senior Lecturer

Sean Strout  
Principal Lecturer

Paul Tymann  
Professor

Phil White  
Senior Lecturer

Dr. Richard Zanibbi  
Professor

Jennifer Burt  
Senior Staff Assistant - Assistant to the Chair

James "Linus" Craig  
Manager of Technical Services

Peggy Decker  
Staff Assistant

Donald Denz  
Academic Advisor
Jordan Gates  
Sr. Staff Assistant

Jason Harrison  
Staff Assistant

Rebecca O’Connor  
Academic Advisor

Mina Pulcini  
Senior Academic Advisor

Susan Quatro  
Manager of Student Services

Christina Rohr  
Senior Academic Advisor

Mark Stamer  
Technician

Arnela Stupac-Catello  
Systems Administration

Sam Waters  
System Administrator

Cindy Wolfer  
Academic Advisor

William Childs

Tony Dal Santo

Timothy Fossum

Samuel Fryer

Patrick Gillis

Susan Haller

Matthew Hosking

Michael Kurdziel

Adjunct Professors
Research Areas

Below is an alphabetical list of research areas that our faculty engage in, along with the specific faculty that teach and supervise student projects in each area.

Artificial Intelligence

Artificial Intelligence encompasses the study of algorithms and architectures that enable effective decision making in complex environments. Faculty and students work on projects in computer vision, robotics, sensor networks, data mining, document recognition, and the theoretical foundations of decision-making.

- Prof. Zack Butler
- Prof. Edith Hemaspaandra
- Prof. Hadi Hosseini
- Prof. Chris Homan
- Prof. Thomas Kinsman
- Prof. Ifeoma Nwogu
- Prof. Leon Reznik
- Prof. Lingwei Wang
- Prof. Richard Zanibbi

Computer Graphics and Visualization


- Prof. Joe Geigel
- Prof. Reynold Bailey
- Prof. Hans-Peter Bischof
- Prof. Warren Carithers
- Prof. Ifeoma Nwogu
- Prof. Sean Strout

Computer Science Education

Computer Science Education explores the pedagogy of Computer Science focusing on new methods and paradigms for the teaching of the CS curriculum.

- Prof. Ivona Bezakova
- Prof. Jeremy Brown
- Prof. Zack Butler
- Prof. Joe Geigel
- Prof. James Heliotis
- Prof. Hadi Hosseini
Data Sciences

Data Sciences studies the foundational data management and knowledge discovery challenges prevalent in design, analysis and organization of data. This area can be applied in a variety of domains including data management in resource constrained environments, enterprise and multimedia databases, active and secure databases, and knowledge discovery algorithms.

Distributed Systems

Distributed Systems studies systems formed from multiple cooperating computers. This includes the analysis, design, and implementation of distributed systems, distributed middleware, and computer networking protocols, including security.

Languages and Tools

Languages and Tools studies language design and implementation together with architecture and use of software development tools.
Security
Security spans topics from networking to cryptography to secure databases. By choosing different
domains in which to study security, students can gain a broad understanding of both theoretical
and applied knowledge.

- Prof. Hans-Peter Bischof
- Prof. Chris Homan
- Prof. Peizhou Hu
- Prof. Alan Kaminsky
- Prof. James Minseok Kwon
- Prof. Stanislaw P. Radziszowski
- Prof. Rajendra K. Raj
- Prof. Leon Reznik
- Prof. Warren R. Carithers

Theory
Theory studies the fundamentals of computation which include complexity theory to determine the
inherent limits of computation and communication, the design and analysis of algorithms to obtain
optimal solutions within those limits, and theoretical foundations of cryptography.

- Prof. Edith Hemaspaandra
- Prof. Ivona Bezáková
- Prof. Chris Homan
- Prof. Hadi Hosseini
- Prof. Stanislaw P. Radziszowski
Recently Retired

Roxanne Canosa
By Prof. Zack Butler

Roxanne Canosa joined the CS department in the fall of 2003, having completed her PhD in Imaging Science at RIT. Over the years, she took to heart the various roles of a faculty member: scholarship, teaching and service, all with a student focus. For many years, she was the department lead on our assessment activities, and took very seriously the role of making sure that we were continually analyzing our teaching and educational outcomes to create the best learning experience that we could. She also taught several different courses, including an Image Understanding course that she developed, and a course in CyberEthics that was a long-time personal passion. No matter the courses she taught, she always had some of the most well-attended and well-appreciated office hours of any faculty member on the hallway. Under quarters, when the Algorithms course was not required, she regularly opened up her sections to many students above the official capacity, to make sure that all those interested could attend. My first interaction with Roxanne was when I joined the department and was asked to teach Professional Communications - Roxanne was very generous with her notes and experiences. When Roxanne retired, the department lost a dedicated, collegial and thoughtful colleague, but we were pleased to be able to offer our well-wishes on the next part of her life's adventure.

Hank Etlinger
By Prof. Rajendra Raj

Hank Etlinger started at RIT in September 1975 in the academic unit that eventually became the Department of Computer Science. Like other faculty in those days, Hank focused on teaching and used consulting opportunities to bring practical knowledge back into the classroom. To ensure consistent teaching across multiple courses, Hank worked with the Faculty Program and Development unit, an early variant of today's Teaching and Learning Services. Hank's work in this space appeared in ACM's SIGCSE conference back in 1981, making him one of the pioneers in what is now called CS Education research. Hank also leveraged his work in systems analysis and design to pave RIT's involvement in the then emerging discipline of software engineering. Hank spent a sabbatical at CMU's Software Engineering Institute, and he worked with Mike Lutz (now professor emeritus) to launch the first software engineering lab within the department with NSF funding. This collaboration subsequently led to the creation of the first undergraduate software engineering program in the world.
Hank also helped to lead many initiatives that RIT now takes for granted: a revamped general education regime for all RIT undergraduates, mid-tenure guidance for faculty, improved internal policies for new degree program development, enhancement to RIT’s global initiatives, and so much more. Within the department, Hank was the de facto leader of the semester curriculum conversion of effort for all our departmental programs: BS CS, BS/MS CS, MS CS, other BS/MS programs, as well as the CS minor. His attention to detail helped transition the rest of the college’s programs to semesters. Hank was always the go-to-person to get curricular and administrative issues--big and small--resolved! Under Hank’s tenure as the undergraduate coordinator for CS over the past several years, the department’s programs became arguably the best-run in the college and RIT. Hank’s retirement has left a major void in the department and college! The department wishes him a successful act after RIT.

Roger S. Gaborski
By Prof. Hans-Peter Bischof

Dr. Roger Gaborski joined the Computer Science Faculty in September of 1998. He brought 10 years of experience as a Senior Research Scientist at Kodak with him to RIT. His research has included work in machine learning, evolutionary algorithms, pattern recognition, and cognitive-based image understanding. Roger was the Computer Science Master’s Program Director in 2001-2002. Roger contributed to the CS program as a respected and successful teacher, researcher, and administrator. Roger retired in June of 2015, and has moved on to the world of arts.

Roger combines analytical and artistic skill through wood working. One of his latest creations is based on a femisphere, which is one single surface, four vertices, and two edges. Mathematics, analytics, and programming skills have been used to create these pieces of art.

Trudy Howles
By Prof. Rajendra Raj

Trudy Howles joined the CS department as an assistant professor in 1997, after having taught courses for both the department and NTID on a part-time basis for several years. Prior to RIT, she had spent several years in industry, including stints at Eastman Kodak and Digital Equipment
Corporation, and running her own consulting services company. As a faculty member, Trudy showed a remarkable and consistent focus on improving the student experience. One of her first major projects in this area was a longitudinal study of incoming CS freshman over a period of five years. This project looked at student backgrounds, learning styles and personality traits to look for connections to grades, retention and overall student success. This project resulted in Trudy's coordinating the university-wide Faculty Learning Community programs for five years and helped to launch the university's support both for improving the student cohort experience and for underrepresented students, especially females. These experiences culminated in an NSF STEM Computing Undergraduates Scholarship Program, where Trudy as the Principal Investigator awarded almost $500K in scholarships to increase the diversity of our undergraduate student body.

As RIT transitioned from the primarily-teaching based model to a comprehensive university model, Trudy moved her teaching focus to other areas of computing, particularly data science. She developed the department’s first undergraduate data mining course, which continues to be among the most popular undergraduate electives for CS students. She also launched and completed her doctoral degree while maintaining a full faculty load. Passionate about software quality, Trudy was a senior member of the American Society for Quality (ASQ) and served as the Associate Editor for Software Quality Professionals.

Funded by Microsoft, Trudy and colleague Paul Tymann worked with high school instructors to develop a Computer Science Principles course based on CSPrinciples.org and computational thinking, helping to place RIT among the first universities to offer such a course. Given her deep knowledge of assessment, Trudy has served as an External Assessment Specialist for several NSF funded grants in computing education. Although she retired in 2015 as Professor Emerita, Trudy returned to help out the department during an unforeseen enrollment growth by teaching our data science courses while continuing to consult on several NSF projects. In all, the department will miss Trudy’s data science expertise, commitment to quality, and professionalism while wishing her well in the next chapter of her life.

Fereydoun Kazemian
By Prof. Warren Carithers

Professor Fereydoun Kazemian retired from RIT after 30 years as a member of the Computer Science faculty. He came to RIT in December 1986 after receiving his Ph.D in Computer Science from Kansas State University. With a wide range of interests (Programming Languages, Artificial Intelligence, Software Engineering, and more), he was a valuable member of the CS faculty, willing
and able to teach a wide range of courses covering not only those areas but many more (including Operating Systems, Data Communications, and Scientific Applications Programming, among others).

Ferey was also involved in the development of the original Software Engineering undergraduate curriculum in the mid-1990s, and regularly taught courses for that department as it was getting off the ground. He also developed and taught a Scientific Computing course for EE students which evolved into a more general Computational Problem Solving for Engineers course in recent years. Although he found himself primarily teaching undergraduate courses most recently, over his three decades on the faculty he served as MS thesis or project advisor for many CS graduate students, and as a committee member for even more.

Professionally, Ferey was a regular contributor to Software Engineering and Applied Computing workshops and symposia, serving as a reviewer, a panel member, or a session chair on numerous occasions. He reviewed submissions for several IEEE publications (IEEE Computer, IEEE Software) and conferences (FIE), ACM conferences (SIGCSE), and textbook proposals and manuscripts for numerous publishers in the areas of Programming Languages, Software Testing, and Requirements Engineering. He also taught professional development courses for employees of local companies through RIT's Corporate Education and Training Program for a number of years.

As a colleague, Ferey was always willing to lend an ear and a voice to discussions in hallways, offices, labs, or anywhere that faculty congregated. He could be counted on to offer commentary on the "topic du jour", and his sense of humor and ability to find amazing detail in everyday things meant that encountering him in the hallway, mailroom or kitchen could be counted on to brighten your day. While he will be missed, we congratulate him on his career, and look forward to hearing from him as he moves into this next phase of life.
In Memoriam

Professor Emeritus Wiley McKinzie, who retired in May after a 42-year career at RIT, passed away in January 2017. He was 82.

Prior to starting his career at RIT, McKinzie served in the United States Marine Corps in Japan from 1953 to 1957 and then earned a degree in mathematics and a graduate degree in computer science.

McKinzie served administrative positions most of his time at RIT. He joined RIT’s School of Computer Science and Technology in 1974 as a faculty member and became the school’s director from 1982 until 1987, when he was appointed interim dean, and dean of the College of Applied Science and Technology in 1988.

He served 18 years as dean of CAST until 2006 and co-authored the proposal to create the B. Thomas Golisano College of Computing and Information Sciences. In 2007, he became vice dean of Golisano College and in 2012, a full-time faculty member in the Department of Computer Science, a post he held until his retirement.

“Wiley devoted his long career at RIT to assessing future needs of our students and helping the university grow to accommodate those needs in CAST and GCCIS,” said RIT President Bill Destler. “His work here - and around the world - helped groom students for successful careers and will be remembered for years to come. Our thoughts are with his family and friends.” S. Manian Ramkumar, the current interim dean at CAST, remembers being mentored by McKinzie when he came to RIT as a master’s student in 1989. He said McKinzie helped RIT pioneer online undergraduate study and was always supportive of ideas from his faculty. “He was the most innovative dean, introducing new programs,” Ramkumar said. “He knew how to synergize different programs. And the RIT international programs we have today, he laid the foundation for some of that.”

During his tenure, CAST was active in international outreach with the delivery of hospitality and travel management programs online and in Kosovo, Croatia and Taiwan. By 2000, with about 6,000 students taking 30 academic programs, CAST accounted for more than 40 percent of RIT’s enrollment.
RESEARCH AND SCHOLARSHIP

Publications

Below is a list of publications by faculty and students from the Department of Computer Science that appeared in 2017. Please note that in Computer Science, due to the rapid development of new techniques, many of the most prestigious publication venues are conferences rather than journals. For the same reason technical reports are cited frequently, particularly those appearing in the arXiv.org collection maintained at Cornell University.

Publications are grouped by type, and then listed alphabetically by first author within each group. In total 8 dissertations/theses and 66 academic publications were produced in 2017.

Doctoral Dissertations


Master’s Theses


Journal Papers


**Book Chapters**

**Conference Papers**


33. Mao, Y., Oak, J., Pompili, A., Beer, D., Han, T., and Hu, P. **Draps: Dynamic and resource-aware placement scheme for docker containers in a heterogeneous cluster.** In IEEE 36th International Performance Computing and Communications Conference (San Diego, California, USA, December 2017), IPCCC’17.


**arXiv Preprints and Technical Reports**


## Funding

External research funding held by faculty in the Department of Computer Science that was active or newly awarded in 2017 are listed below.

<table>
<thead>
<tr>
<th>Investigators</th>
<th>Sponsor</th>
<th>Project Title</th>
<th>Duration</th>
<th>Funds (USD$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butler, Zachary; Bezáková, Ivona</td>
<td>NSF</td>
<td>On Beyond Sudoku: Pencil Puzzles as an Engaging Problem Domain for Introductory Computer Science</td>
<td>9/15/2013 - 8/31/2017</td>
<td>$80,000</td>
</tr>
<tr>
<td>Frank, Mark; Nwogu, Ifeoma</td>
<td>NSF</td>
<td>SBE: Deceit and Interactional Synchrony In Different Social Constellations</td>
<td>5/2017-4/2020</td>
<td>$299,963</td>
</tr>
<tr>
<td>Fluet, Matthew</td>
<td>NSF</td>
<td>II-EN: Collaborative Research: Positioning MLton for Next-Generation Programming Languages Research</td>
<td>8/1/2014 - 7/31/2019</td>
<td>$224,329</td>
</tr>
<tr>
<td>Hemaspaandra, Edith</td>
<td>NSF</td>
<td>Graduate Research Fellowship Program</td>
<td>6/1/2014-6/30/2017</td>
<td>$138,000</td>
</tr>
<tr>
<td>Homan, Christopher</td>
<td>NIH/UR</td>
<td>ECapacity Development &amp; Growth In The ASPIRE Network</td>
<td>5/18/2015 - 4/30/2018</td>
<td>$13,825</td>
</tr>
<tr>
<td>Hosseini, Hadi</td>
<td>RIT</td>
<td>OVPR (GWBC 2017) Efficiency and Truthfulness in Matching Under Uncertainty</td>
<td>5/1/2017 - 8/31/2018</td>
<td>$5,000</td>
</tr>
<tr>
<td>Kwon, Minseok; Hartpence, Bruce; Park, Gahyun</td>
<td>Cisco Systems Inc</td>
<td>A Length-Aware Cuckoo Filter for Packet Forwarding at Routers</td>
<td>12/22/2016 - 3/1/2018</td>
<td>$77,897</td>
</tr>
<tr>
<td>Name(s)</td>
<td>Agency/Program</td>
<td>Project Title</td>
<td>Duration</td>
<td>Amount</td>
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<tr>
<td>Łukowiak, Marcin; Radziszowski, Stanislaw; Kaminsky, Alan</td>
<td>Harris</td>
<td>Authenticated Encryption Customization</td>
<td>6/1/2016 - 5/1/2018</td>
<td>$48,000</td>
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<tr>
<td>Narayan, Darren; Radziszowski, Stanislaw</td>
<td>NSF</td>
<td>REU Site: Extremal Graph Theory and Dynamical Systems</td>
<td>1/1/2014 - 12/31/2017</td>
<td>$287,848</td>
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<tr>
<td>Ovesdotter Alm, Cecilia; Bailey, Reynold</td>
<td>NSF</td>
<td>REU Site in Computational Sensing</td>
<td>4/1/2016 - 3/31/2019</td>
<td>$359,866</td>
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<tr>
<td>Reznik, Leonid</td>
<td>NSA</td>
<td>Intelligent Security Systems</td>
<td>3/27/2017 - 10/31/2018</td>
<td>$118,926</td>
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<tr>
<td>Reznik, Leonid</td>
<td>NSF</td>
<td>Data quality and security evaluation framework for mobile devices platform</td>
<td>9/1/2016 - 8/31/2019</td>
<td>$200,042</td>
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<tr>
<td>Rivero Osuna; and Carlos Rafael</td>
<td>RIT</td>
<td>OVPR (GWBC 2016) - Efficient Query Engines Using State-of-the-art Subgraph Matching Algorithms</td>
<td>5/1/2016 - 8/31/2017</td>
<td>$5,000</td>
</tr>
<tr>
<td>Zanibbi, Richard; Giles, Lee</td>
<td>Alfred P. Sloan Foundation</td>
<td>Improving Discovery of Scientific and Scholarly Information through Math-Aware Search</td>
<td>7/1/2017 - 6/30/2020</td>
<td>$370,458</td>
</tr>
</tbody>
</table>

**Notes**

- The first name listed for each grant is the project lead (Principal Investigator)
- **NSF** - National Science Foundation
- **NSA** - National Security Agency
- **NIH/UR** - National Institute of Health/University of Rochester Medical Centers
Editors
Jeremy Brown
Jennifer Burt
Chris M. Homan
Doug Moyer
Rebecca O’Connor
Adam Purtee
Richard Zanibbi

Our sincerest thanks to all CS faculty and staff who contributed to (and/or waited patiently for) this first edition