Ed Carr

Department of Computer Science
North Carolina A&T State University

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"In the Computer Science Department at North Carolina A&T State University, we live, work, and study in the presence of greatness... And this makes all the difference."

~ The Computer Science Faculty
Computer Science

Degree Programs
- Undergraduate
  - B.S. Computer Science – 200
    - 30% Female
- Graduate
  - M.S. Computer Science – 50
    - 40% Female
  - Ph.D. – 15

Departmental Personnel
- Faculty
  - 11 Tenured/Tenure-track, 1 Vacancy
  - 2 Non-Tenure Track
- Staff (3)
New Developments:

– Scholarship for Service
  • $4k/month for 9 months
  • $1000/wk for 10wks in the Summer
  • **Total: $46,000**

– The Center for Advanced Studies in Identity Science (CASIS) Research Assistantships
  • $4k/month for 9 months
  • $1200/wk for 10wks in the Summer
  • **Total: $48,000**

– NNSA Cybersecurity Consortium ($1.6M)
– CASIS (additional $4.5M)
– Bank of America Undergraduate Research Program in Active Authentication
Industrial Advisory Board

- New Relic
- NetApp
- CISCO
- Google
- Bank of America
- Eli Lilly
- Lockheed Martin
- Northrup Grumman
Recent Graduates at Work

- Government: CIA, FBI, NSA, NNSA, USAF, UNC-Ch
- Private: IBM, CISCO, Northrup Grumman, Lockheed Martin, Credit Swiss, Red Hat, Eli Lilly, Goldman Sachs...
Internships

- Current: Apple, Facebook, IBM, CISCO
- 2017: Google
Master of Science in Computer Science (M.S.C.S.)

Five tracks of concentration:

» Artificial Intelligence
» General Track
» Software Engineering
» Cyber Security
» Secure Software Engineering
Admission Requirements M.S.C.S.

Admission Requirements:

» 3.0 GPA and undergraduate degree in Computer Science

» Undergraduate degrees in Mathematics and Physics would also be acceptable with the following requirements

Conditional Admission:

» Students with undergraduate degrees in Mathematics or Physics may be accepted either conditionally or unconditionally provided that they have had the following undergraduate courses: object oriented programming language, data structures, algorithms, operating systems and computer architecture.
Degree Requirements

Core Area:

» COMP 755  Advanced Operating Systems:
This course centers on operating systems for multi-processing environments: concurrent processes, mutual exclusion, job scheduling, memory, storage hierarchy, file systems, security, and distributed processing. Also discussed are virtual resource management strategies. A design project involving the construction of operating facilities is produced.

» COMP 785  Advanced Design and Analysis of Algorithms
This course discusses the design and analysis of efficient algorithms and algorithmic paradigms. Applications include sorting, searching dynamic structures, graph algorithms, computationally hard problems, and NP completeness.
Software Engineering Track

- COMP 710  Software Specification, Analysis and Design
- COMP 711  Software System Design, Implementation, Verification, & Validation
- COMP 712  Software Project Management
- COMP XXX  Software Engineering Elective
Cyber Security

- COMP 620 Information, Privacy, and Security
- COMP 621 Web Security
- COMP 726 Network Security
- COMP XXX Cyber Security elective
Secure Software Engineering

- COMP 710  Software Specification, Analysis, & Design
- COMP 725  Software Security Testing
- COMP 727  Secure Software Engineering
- COMP XXX  Secure Software Engineering elective
Artificial Intelligence

- COMP 645  Artificial Intelligence
- COMP 740  Advanced Artificial Intelligence
- COMP XXX  AI Electives
General Track

- COMP 681  Formal Methods
- COMP 710  Software Specification, Analysis, & Design
Three Options

- Thesis (6 hours thesis, 27 hours of classes) Note: recommended if also continuing toward Ph.D.
- Project (3 hours project, 30 hours of classes)
- Course work (total of 33 hours of classes)
Doctor of Philosophy in Computer Science

- Earned by the completion of required course work, research and dissertation.
- Students must specialize in one of the research areas (Software Engineering, Secure Software Engineering, Cyber Security, Artificial Intelligence, others)
- Meet all requirements for Ph.D. in CS (Non-Course Requirements)
# Course Work

## Core Courses:
- COMP 755 Operating Systems
- COMP 785 Advanced Design & Analysis of Algorithms
- COMP 882 Doctoral Research Methods

## Security Courses:
- COMP 821 Cloud Computing & Security
- COMP 823 Secure Social Computing

## Artificial Intelligence and Web-Based Software courses:
- COMP 832 Advanced Biometrics
- COMP 841 Computational Intelligence
- COMP 872 Social Semantic Web
- COMP 881 Advanced Multiagent Systems
Non-Course Requirements for a Ph.D. in Computer Science

- COMP991 Doctoral Qualifying Examination
- COMP892 Doctoral Research Methods
- COMP994 Doctoral Research Examination
- COMP995 Doctoral Preliminary Examination
- COMP997 Doctoral Dissertation
Admission to Ph.D. Program

Requirements:

Option 1:
- Master of Science in CS with GPA of at least 3.25
- GRE: verbal score 450 (150 new scale) and quantitative score 700 (155 new scale)

Option 2:
- B.S. in CS with GPA of at least 3.5
- GRE verbal score of 500 (153 new scale) and quantitative score of 750 (159 new scale)
Current Research

- Computational Framework for Identity
- Extending the Use of WebIDs
- Author Identification
- Mitigating Replay Attacks
- Web Client Identification
- Cyber Threat Identification
Dr. Albert C. Esterline

- Computational Framework for Identity
- Extending the Use of WebIDs
- Identity Theory
- Multagent Systems
- Concurrency
Dr. Kaushik Roy

- Author Identification
- Mitigating Replay Attacks
- Biometrics
- Big Data
Dr. Xiaohong Yuan

- Web Client Identification
- Cyber Threat Identification
- Information assurance
- Director of The Center for Cyber Defense
The Center for Cyber Defense (C²D)

- A Recognized National Center for Academic Excellence in Information Assurance by NSA and DHS.


- Composed of three NCA&T Laboratories:
  - Cyber Defenders Lab (Computer Science)
  - Cyber Defenders Lab (Mathematics)
  - Information Systems Security Lab (Management)

- Recently received funding from:
  - NSF ($3.56M)
  - DOE ($600K)
  - NRO ($200K)
  - NNSA ($1.6M)
Dr. Gerry Dozier, chair

- Artificial Intelligence (Genetic Algorithms)
- Biometrics
- Director of CASIS– Center for Academic Studies in Identity Sciences
- Director of Beacon-Bio/Computational Evolution in Action Consortium
The Center for Advanced Studies in Identity Science (CASIS)

- 1st Office of the Director of National Intelligence Science & Technology Center of Academic Excellence in the nation.
- Performs research in Cyber Identity, Tightly-Coupled Face, and Facial Aging
- Composed of three universities:
  - NCA&T (Lead): Cyber Identity Protection & Privacy
  - Clemson, Periocular and Soft Biometrics
  - UNC-Wilmington, Facial Aging, Mobile Forensics
- Funded by 5yr, $8.93M grant from the ARL
Bio/computational Evolution in Action
Consortium: BEACON@A&T ($5M)

NSF S&T Center:
- Michigan State (Lead),
- North Carolina A&T,
- University of Idaho, University of Washington
- University of Texas

• BEACON@A&T Researchers
  - Computer Science
  - Electrical & Computer Engineering
  - Industrial & Systems Engineering
  - Biology

• BEACON@A&T Partners
  - Secure Designs, Inc.
  - NASA Marshall Space Flight Center
Dr. Kenneth Williams

- Information Assurance
- Encryption
- Computer Science Education
- NNSA Consortium Enabling Cybersecurity Opportunities & Research
Grants

- A&T is ranked third among UNC system in acquiring grant funding
- Our department has been awarded recently grants from Department Of Defense, National Science Foundation, National Aeronautics and Space Administration, Naval Oceanographic Office, U.S. Air Force, and others…
My Grants

- NSF (TUES): Computing In Context (200K)
- Consortium Enabling Cybersecurity Opportunities & Research (1.6M)
Computing In Context

- Network Science: Our goal was to develop educational modules that could be used to teach courses in this area. We considered visualization of social networks using GraphViz and NetworkX.

- Next workshop: June 16-18. The grant contains funding to cover the travel expenses of all who can attend. It is likely that the workshop will be held in Asheville, NC.
Consortium Enabling Cybersecurity Opportunities & Research

- In 2015 NC A&T received a $1.6 million grant from the National Nuclear Security Administration as part of a consortium of HBCUs
- The goal is to provide a pipeline from the public school systems through college to graduate school and then to the national labs
NC A&T Participation

- NC A&T concentrates on providing graduate education to students in the consortium.
- We send about 6 - 8 students to the national labs each summer to work as interns.
- NC A&T pays the airline, housing and stipend for students going to the labs.
- Linux Boot Camp using Raspberry Pi’s to prepare students for work at either Sandia or Lawrence-Livermore national labs (Me).
Research sponsored by CECOR

- During the academic year, faculty and graduate students do research in the area of cyber security
- We have about $100,000 for graduate students during the academic year
Research Experience for Undergraduates

- Cyber Identity this summer.
- 1 position left
- URL: Cyber REU
North Carolina A&T State University
Computer Science

Thank You!!!