THE UNIVERSITY OF TENNESSEE CHATTANOOGA

COLLEGE OF ENGINEERING & COMPUTER SCIENCE

Academic Program Review

Computer Science

Master of Science

Degree Program

Self-Study Report

Academic Years 2017-2022

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Preface and History

The last review of the Master of Science in Computer Science degree program at the University of Tennessee at Chattanooga (UTC) was performed in 2018 (self-study written in 2017). Since 2018, the average enrollment was 58 students (2018: 59; 2019: 58; 2020: 63; 2021: 56, and 2022: 52) with 27% female students.

One of the recommendations of the 2018 reviewer was that the program should attempt to add "new faculty lines incrementally." During the years since that visit, the recommendation to add faculty lines has been addressed as follows: (2017-18: 12 full-time faculty; 2018-19: 13; 2019-20: 15; and 2021-22: 14). There are six faculty line searches for the 2022-23 academic year, including a Department Head and three lecturers. However, it should be noted that not all current faculty are devoted full-time to teaching in the department's academic programs: one serves as Department Head, one as Director of the UTC SimCenter, and one as Director of the UTC Center for Urban Informatics and Progress (CUIP). Another faculty member is Director of the UTC InfoSec Center and is currently on a visiting appointment to the National Science Foundation as a Program Director.

A. History of the University of Tennessee at Chattanooga

The University of Tennessee at Chattanooga (UTC) is a metropolitan university located in the southeastern corner of the state of Tennessee. Chattanooga's metro area has a population of approximately 500,000 people who reside in not only Chattanooga and surrounding areas of southeast Tennessee, but also portions of north Georgia and northeastern Alabama.

UTC became part of the University of Tennessee (UT) System in 1969. The System consists of five major campuses located in Chattanooga, Knoxville, Martin, Memphis, and Pulaski. Governance is provided through a UT System President, Chancellors on each campus, and the UT Board of Trustees. The Governor appoints the voting board members including the

Chairman.

Prior to becoming part of the UT System, the university was a private university, known as the University of Chattanooga (UC). UC was founded by an agency of the Methodist Episcopal Church in 1886. Other institutions in the Chattanooga area, including Chattanooga City College (CCC), a predominately African-American institution, became part of the UT System merger in 1969.

At the time of the merger in 1969, UC's student population was slightly more than 2,200. Now as a public institution, UTC serves over 11,000 students. Approximately 12 percent of UTC's students are enrolled in graduate programs. Overall, UTC's students represent not only Tennessee (coming from 70 Tennessee counties), but also more than 40 states and 40 foreign countries.

B. Background of the Computer Science Graduate Program

The Master of Science (MS) degree in Computer Science at UTC is designed for students with a bachelor's degree in computer science or a closely related field; however, the program accepts students with undergraduate degrees in other fields. Students are individually evaluated for admission to the program, and applicants lacking knowledge in key areas of computing sciences and/or mathematics are assigned prerequisite courses to prepare them for the master's degree program.

The master's program in Computer Science has three concentrations – one general and two focused in specific areas of study. The general concentration is known simply as "Computer Science" and allows students maximum flexibility in choosing electives in their areas of interest. The two focused concentrations are in Cyber Security and Data Science; they provide students the opportunity to study the chosen area in more depth, but have less room for unrestricted electives. All three concentrations require 15 credit hours of Computer Science core courses,

which currently may be chosen as any five courses from a list of seven (CPSC 5100, 5210, 5260, 5410, 5590, 5700, 5800). The Cyber Security and Data Science concentrations have additional core and focus area/elective courses in those specific areas of study. To earn a master's degree in any of the three concentrations requires students to complete a minimum of 33 graduate credit hours including a thesis, or 36 hours including a project. The breakdown of credit hours required for each concentration is shown below in Table 1.1.

Table 1.1. Distribution of Credit Hours in M.S. Computer Science Concentrations

	Computer Science		Cyber Security		Data Science	
	Project Option	Thesis Option	Project Option	Thesis Option	Project Option	Thesis Option
CS Core	15	15	15	15	15	15
Concentration Core			6	6	6	6
Focus Area Electives			6	3	6	6
CS Electives	9	9	6	3		
Unrestricted Electives	9	3			6	
Project	3		3		3	
Thesis		6		6		6
Total	36	33	36	33	36	33

Part I. Program Objectives and Learning Outcomes

1.1 Program Objectives

The Department of Computer Science and Engineering (CSE) at UTC prepares students for productive and challenging careers in computer science to function as leaders in a technological society. The department exists as the region's principal resource for educational, research, continuing professional education, and service programs in computer and information technology. Programs hosted in this department emphasize communication, problem solving competencies, and applications of basic theory and design. We strive to:

- prepare students for rewarding professional careers or graduate study in computing-related fields with a commitment to life-long learning;
- prepare professional and graduate students for continuing professional development and career advancement;
- support faculty and staff for excellence in research, teaching, and service; and
- engage students, faculty, staff, and the community for diversity, inclusion, and excellence.

The UTC CSE Department has adopted the following MS Program Objectives (POs):

As part of the work force or the academic environment, UTC M.S. Computer Science graduates will:

1. Successfully function as responsible and ethical professionals and leaders in computer science or closely related disciplines
2. Function effectively in inclusive, multidisciplinary environments and adapt to various environments
3. Participate in further knowledge building opportunities

1.2 Learning Outcomes

The department assessment committee decided to adopt the following learning outcomes:

Table 1.2 Learning Outcomes

Outcome Number	Description of the Outcome
1	Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
2	Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3	Communicate effectively in a variety of professional contexts.
4	Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5	Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
6	Apply computer science theory and software development fundamentals to produce computing-based solutions.

Table 1.2 shows the learning outcomes. Table 1.3 shows the mapping of learning outcomes to competencies in MS core courses. Table 1.4 shows the mapping between MS courses to learning outcomes. As shown in these tables, every course covers at least one outcome and every outcome is covered by at least two courses.

Table 1.3 Mapping of Learning Outcomes to Competencies in MS Core Courses

Outcomes	Competencies
1 Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions	1) Demonstrate knowledge of and use algorithms. (5100, 5900) 2) Ability to solve a problem using algorithms such as recursion, searching, sorting, and graph (5100, 5900) 3) Ability to evaluate the performance and complexity of computing algorithms, data structures and other computing theory techniques. (5210) 4) Ability to demonstrate knowledge of classical data structures (trees, heaps, linked lists, graphs) used to process them (5210/5260)
2 Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.	1) Ability to develop and implement a computing-based software solution corresponding to requirement specification (5100, 5210, 5800, 5590) 2) Ability to identify various testing techniques and strategies and develop test cases for black box testing, white-box testing, and boundary testing (5100, 5800, 5590) 3) Ability to evaluate pipeline throughput in machines with and without branch prediction (5700)

	4) Ability to determine key instruction set design parameters for a notional computer architecture (5700)
	5) Ability to evaluate various network topologies that may be used in parallel computer systems (5700, 5590)
3 Communicate effectively in a variety of professional contexts.	1) The presentation has a clear purpose and is well organized (5260, 5900/5999)
	2) The delivery of the presentation is effective and professional (5900/5999)
	3) The paper has a stated purpose and clear organization of ideas (5900/5999)
	4) Material is referenced correctly and cited in a standard formatting style (5900/5999)
	5) Demonstrate ability to develop documentation during the software development life cycle (5900/5999)
	6) Demonstrate ability to communicate and present effectively with stakeholder in oral and written manners (5900/5999)
4 Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.	1) Recognize security issues and compliance in operating systems (5590)
	2) Demonstrate skills in system and file protection in operating system (5800)
	3) Demonstrate an awareness and understanding of controversial issues relating to computing and society (5680, 5800)
	4) Demonstrate informed judgment regarding a relevant ethical issue (5680, 5800/5900/5999)
5 Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.	1) Students work in a team to research, write, and present a technical report(5700)
	2) Demonstrate the team ability to develop documentation for requirement specification, design specification, source code documentation, and testing documents for a system (5215, 5260)
	3) Demonstrate the team ability to design, develop, and test a software system and its source codes (5900/5999)
	4) Demonstrate teamwork (5590, 5900)
6 Apply computer science theory and software development fundamentals to produce computing-based solutions.	1) Demonstrate the ability to produce requirement specification, design specification, documenting source codes, and test the developed software system (5800, 5900/5999)
	2) Demonstrate the ability to implement and deliver a software system that meets requirement specification and fulfills through tests (5410, 5260, 5900/5999)
	3) Demonstrate knowledge of understanding of cost and other benefits of the computing technique chosen (5900/5999)

		4) Ability to produce functional software solutions to solve a problem that meet stakeholders' requirements (5900/5999)

Table 1.4 Mapping of All MS Courses to Learning Outcomes

Course	1 analyze/solution	2 design/evaluate	3 comm	4 prof	5 team	6 produce solution
CPSC 5000	x					
CPSC 5010	x	x				
CPSC 5020		x	x			
CPSC 5100	x	x		x		
CPSC 5175	x					
CPSC 5180	x	x				x
CPSC 5210	x	x				
CPSC 5220	x					
CPSC 5240			x	x		
CPSC 5180		x			x	x
CPSC5610	x	x				
CPSC 5800		x		x		x
CPSC 5260	x	x			x	x
CPSC 5410	x					x
CPSC 5130	x	x				
CPSC 5140	x	x				
CPSC 5200						
CPSC 5440						
CPSC 5590				x	x	
CPSC 5600	x	x	x		x	
CPSC 5610	x	x				
CPSC 5620		x				
CPSC 5660		x	x			
CPSC 5270		x			x	
CPSC 5680		x				
CPEN 5700		x			x	x
CPEN 5710	x	x				
CPSC 5720	x	x				
CPSC 5900	x	x	x	x	x	x
CPSC 5999	x	x	x		x	x

A set of cohort courses, one or two per learning outcome, was developed. This set of courses assures that all learning outcomes are sampled at least once during a typical period of study for a student. These courses are all taken from the core to assure that all students will take the cohort courses. Table 1.5 gives the cohort courses and the schedule for assessment.

Table 1.5 Cohort Courses and Schedule for Assessment

Assessment Schedule											
		FA18	SP19	FA19	SP20	FA20	SP21	FA21	SP22	FA22	SP23
CPSC	5100	▒				▒					
CPSC	5180			▒					▒		
CPSC	5210			▒					▒		
CPSC	5240				▒				▒		
CPSC	5260										
CPSC	5270			▒				▒			
CPSC	5440							▒			▒
CPSC	5530										
CPSC	5590			▒							
CPSC	5600										
CPSC	5620		▒					▒			▒
CPSC	5660										
CPSC	5680	▒				▒				▒	
CPSC	5700								▒		
CPSC	5800				▒	▒			▒		

For each cohort course, a set of competencies was developed by the faculty. A mapping of courses to Learning Outcomes and Competencies can be found in Table 1.3.

1.3 Program Evaluation, Assessment and Continuous Improvement

1.3.1 Evaluation and Assessment

The program assessment and evaluation processes consist of the following:

(i)   Learning Outcomes – Table 1.2
(ii)   Mapping of program courses to the (1-6) learning outcomes (Table 1.4) and mapping of outcomes to competencies (Table 1.3).
(iii)   Selection of a cohort of core courses to be used for assessment, and the assessment schedule – Table 1.5.
(iv)   Instructor-selected specific student artifacts in cohort courses and evaluation form.
(v)   Evaluation rubrics.

Method of Assessment: Instructor-Selected Specific Student Artifacts (Exam questions, labs, projects, etc.)

To start a course assessment, an instructor selects a set of students' artifacts for assessing. Students taking the courses being assessed are considered a *sampling of the general computer science graduate student population in the program*. Courses for assessment were selected in such a way that the sampling *cohort of courses* **should cover all student outcomes** and involve as broad a cross-section of the graduate student population as possible.

To facilitate the assessment under this approach we did the following:

- The program faculty voted to take the ABET 1-6 outcomes as the CSE graduate program student outcomes. (Table 1.2)

- All courses were mapped to our set of student outcomes. This mapping can be found in Table 1.4.

- A set of cohort courses, one or two per student outcome, was developed. This set of courses assures that all student outcomes are sampled at least once during a standard period of study for a student. These courses are all taken from the curriculum core to assure all students will take the cohort courses. (See Table 1.4)

- For each cohort course, a set of competencies was developed by the faculty. A mapping of courses to Student Outcomes and Competencies can be found in Table 1.3.

- For each cohort course, a selection of student artifacts is made by the course instructor, each time the course is taught. These artifacts may consist of exam questions, homework questions, presentations, projects, etc. See tables under each *Performed Assessment* in all Student Outcomes.

- An assessment rubric for core courses selected for sampling was developed and used to assess the student performance on the artifacts against a selected performance target. See tables under each *Performed Assessment* in all Student Outcomes.

- Currently student performance in each cohort course is assessed against the competencies predefined for each outcome. If a performance target is not met for the applicable competency, the instructor recommends remedial action(s). (Note: a course may have multiple student outcomes to measure during the assessment process.)

- At the end of each semester, the CSE faculty selects an assessment day when the assessment sheets from all the courses due for assessment are reviewed and recommendations made to the full faculty for action. The assessment sheet includes the following:

  - Course name
  - Course description
  - Student outcomes covered by the course and the specific student outcome assessed on this assessment sheet (a separate sheet is used for each student outcome to make sure that every student outcome due for assessment in this course is assessed)
  - Performance target for attainment of the competency based on the rubric; currently as follows: 80% for graduate courses
  - Competencies being assessed
  - Description of the student artifacts used (exam question, homework question, presentation, paper, etc.)
  - Results of the assessment

- Assessments sheets are due to the CSE Assessment Committee at the end of the semester. Below is a sample of the assessment sheet used.

Computer and Engineering Course Assessment Sheet:
CPSC XXXX – Course Name

Outcome X: Definition of the Outcome:
List the definition of the outcome

Course Number and Name of the Course:

CPSC XXXX – Name of the course

Catalog description of the course: ……

Competencies to measure Outcome X: …..

Target: Meets or exceed expectations is equal to or greater than 80%.

Implementation Plan (timeline): Fall 20xx
Key/Responsible Personnel: Instructor name

Competencies: …….

Student Artifact Used:
List the Artifact and the question …

Meets or Above Expectations: 0.00%

      Above Expectations: 0.00%
      Meets Expectations: 0.00%
      Below Expectations: 0.00%

Results: Target Achievement: ?

Recommendations: *?*

Summary of Findings for the outcome:

      Meets or Exceeds Expectations: 0.00% (overall percentage)

      Above Expectations: 0.00% (overall percentage)
      Meets Expectations: 0.00% (overall percentage)
      Below Expectations: 0.00% (overall percentage)

Results: Target Achievement: ?

Recommendations: *?*

Detailed Assessment of
Course Number and Name

Table 1 Course Assessment Plan

Student artifacts (assessment mechanism)	Target Student Outcomes/competencies

Table 2 Spreadsheet for Student Performance on Student Artifacts

Stud. Artifact Student ID	Outcome X – …. Final exam, Question ?
STU01	
STU02	
STU03	
STU04	
STU05	
STU06	
STU07	
STU08	
STU09	
STU10	

Table 3 Summary of Findings

Objective Letter	
Artifact Rubric score / Outcome X	Outcome X
	Artifact/question
Total Exceeds	x
Total Meets	x
Total Below	x
Total Students	x
Exceeds %	0.00
Meets %	0.00
Below %	0.00
Total % of Meets and Exceeds for the competency	0.00
Overall % of Meets and Exceeds for Outcome A	0.00

- The full faculty meets (routinely the last full faculty meeting of the semester following final exam week), reviews, and votes whether to approve all assessment committee recommendations for all assessed courses. If, however, during the assessment process of the course a competency for a student outcome is not met, the following *actions* will take place:
  1. A recommendation is made by the current instructor as to how to correct the deficiency.
  2. The CSE Assessment Committee may amend the recommendation before approval.
  3. Results are discussed and approved by the entire faculty.
  4. *Corrective action(s)* is put in place the next time the course is taught regardless of the instructor.

5. The competency is reevaluated the next time the course is taught to assure the corrective action did indeed correct the problem.
6. This process will continue until the student outcome is met.

Using this approach, for a course that is due for assessment, the instructor keeps track of the performance of *each student* for a selected set of student work (student artifacts). The instructor maintains a *spreadsheet* of all *student assessment scores* in each of the selected exercises (artifacts) throughout the semester. These scores are then used in a rubric to evaluate student performance in attaining the skills required in the student outcome for the class.

Full Program Assessment

Below is a sample of a detailed process of our assessment for the Computer Science program for outcomes 1-6. The sample uses CPSC 5260 to demonstrate attainment of outcome 3.

Computer Science and Engineering Course Assessment Sheet:
CPSC 5260 – Introduction to Parallel Algorithms

Outcome 3: Communicate Effectively
Definition of the Outcome:
Ability to communicate effectively in a variety of professional contexts.

Course Number and Name of the Course:

CPSC 5260 – Introduction to Parallel Algorithms

Catalog description of the course: Introduction to parallel and distributed computing; models of parallel computers; parallel programming models; network topologies; performance metrics; theoretical evaluation of algorithms; implementation of candidate algorithms on sample distributed memory and shared memory architectures; background for practical implementation of new algorithms on parallel architectures. Prerequisite: CPSC 5000 or department head approval. (Intermediate knowledge of FORTRAN or C/C++ programming is assumed.) Differential course fee will be assessed.

Competencies to measure Outcome 3: Student can present advanced topics in a clear manner.

Target: Meets or exceed expectations is equal to or greater than 80%.

Implementation Plan (timeline): Spring 2020

Key/Responsible Personnel: Dr. Craig Tanis

Competencies: Student can present advanced topics in a clear manner.

Student Artifact Used:
Final (virtual) presentation

Meets or Above Expectations: 100.00%

Above Expectations: 0.00%
Meets Expectations: 0.00%
Below Expectations: 0.00%

Results: Target Achievement: met

Recommendations: *None*

Summary of Findings for the outcome:

Meets or Exceeds Expectations: 100.00% (overall percentage)

Above Expectations: 0.00% (overall percentage)
Meets Expectations: 0.00% (overall percentage)
Below Expectations: 0.00% (overall percentage)

Results: Target Achievement: Met

Recommendations: *None*

Detailed Assessment of
Course Number and Name

Table 1 Course Assessment Plan

Student artifacts (assessment mechanism)	Target Student Outcomes/competencies
Final presentation	80

Table 2 Spreadsheet for Student Performance on Student Artifacts

Stud. Artifact Student ID	Outcome 3 – …. Final Presentation
STU01	Exceed
STU02	Exceed
STU03	Exceed
STU04	Exceed
STU05	Exceed
STU06	Exceed
STU07	Exceed
STU08	Exceed
STU09	Exceed
STU10	Exceed
STU11	Exceed
STU12	Exceed
STU13	Exceed
STU14	Exceed
STU15	Exceed
STU16	Exceed
STU17	Exceed
STU18	Exceed
STU19	Exceed
STU20	Exceed
STU21	Exceed

Table 3 Summary of Findings

Objective Letter	
Artifact Rubric score	Outcome 3
	Artifact/question
Total Exceeds	21
Total Meets	0
Total Below	0
Total Students	0
Exceeds %	100.00
Meets %	0.00
Below %	0.00
Total % of Meets and Exceeds for the competency	100.00
Overall % of Meets and Exceeds for Outcome C	100.00

Appendix C shows a number of assessed courses using the assessment methods outlined above. For all assessed courses shown in Appendix C, student artifacts used in the assessment can be provided if needed.

Theses and Projects (CPSC 5900/5999r)

Additional assessment is applied to theses or projects. To complete a thesis or project, students must conduct a literature review of topics related to the thesis/project, collect and analyze the data, and draw conclusions, which culminates in the submission of the final thesis or project report. Projects are usually more application-oriented and stem from real-world situations. On the other hand, a thesis requires more theoretical work. Documentation of professional quality and an oral presentation/defense are required for both the thesis and project options. Below are the steps that graduate students must follow to complete the thesis/project:

- Identify a potential thesis/project topic of interest and discuss it with the faculty advisor;

- Write a proposal;

- Develop a schedule;

- Select committee members;

- Conduct literature review;

- Collect data;

- Analyze data;

- Write conclusions and recommendations; and

- Write the thesis or project report and present it.

For the last two years, graduate computer science students have completed a variety of theses/projects in collaboration with various faculty. Table 1.6 shows a selected list of theses produced over the last several years.

Student	Thesis Title	Committee Chair
	Table 1.6. Short List of Theses Completed by UTC Computer Science Students	
1	Knowledge-based artificial neural network modeling assessment: integrating heterogeneous genomics data to uncover lifespan regulation	Qin, Hong
2	Deep learning-based anomaly detection for edge-layer devices	Kandah, Farah
3	Machine learning-enabled classification of climbers using small data	Liang, Yu
4	Addressing smart city challenges utilizing machine learning: vehicular crash and public transportation fuel consumption prediction	Sartipi, Mina
5	Deep learning-based fine-tuned multi-vehicle tracking with classification correction	Sartipi, Mina
6	Extensive Huffman-tree-based neural network for the imbalanced dataset and its application in accent recognition	Liang, Yu
7	An MPI-based 2D data redistribution library for dense arrays	Skjellum, Tony
8	Behavioral Model Anomaly Detection in Automatic Identification Systems (AIS)	Kandah, Farah
9	Clustering algorithms to further enhance predictable situational data in vehicular ad-hoc networks	Kandah, Farah
10	Behavioral model based trust management design for IoT at scale	Kandah, Farah
11	Second-generation polyalgorithms for parallel dense-matrix multiplication	Skjellum, Tony
12	How negative sampling provides class balance to rare event case data using a vehicular accident prediction project as a use case scenario	Sartipi, Mina

1.3.2 Continuous Improvement

The program's continuous improvement is done in two ways:

(1) **In response to shortcomings** in course-by-course evaluations where at the end of each semester, each instructor prepares a course assessment sheet(s) for their course based on each student outcome(s) assessed in that course during that semester. All assessment sheets are then reviewed by the CSE Assessment Committee (many times comprising all the program faculty) and their recommendations are forwarded to the full CSE faculty. The assessment recommendations are discussed by the faculty (usually at the last faculty meeting of the semester, or about a week after final exams) and a final list of courses with action items is developed. The action items are corrective actions that must be implemented by whoever next teaches the course. When this course is next offered, it is assessed again, paying particular attention to those items for which change was recommended. This process continues until the competency, and consequently the associated student outcome, is met.

(2) **In response to our constituencies**; these changes are usually broad and involve program curriculum changes. In response to constituent feedback, there have been a number of changes implemented in the program, including:

(a) Major graduate curriculum review that introduced new, and revised old, concentrations. For example, (i) the Information Security and Assurance (ISA) concentration was changed to Cyber Security to conform to more modern nomenclature; (ii) a new Data Science concentration was started;

1.4 Alignment with Institution's Mission

The MS Computer Science program is designed to align directly with the UTC (https://www.utc.edu/about/utc-vision-mission-and-core-values) and College of Engineering and Computer Science's mission, vision, and values.

<center>**Part II. Curriculum**</center>

2.1. Curriculum Review

The MS Computer Science curriculum has been revised multiple times in the last five

years to appropriately address the needs of current students and attract new students. Specifically:

- Beginning with the 2017-18 catalog, the Computer Science core course list was expanded from five specific, required courses, to a list of seven courses from which students are required to choose five. This allows the students some degree of flexibility in both course scheduling and topical content, while still ensuring that they obtain a solid foundation of essential computer science knowledge regardless of the degree concentration they choose.
- For the Data Science concentration, the course choices listed under two of the five Data Science focus areas (Mathematics, and Biology and Environmental Science) have been revised so they are more relevant to our students.
- The concentration previously known as "Information Security and Assurance" was renamed as Cyber Security in order to better reflect current nomenclature in the field and thus better identify graduates of the program to prospective employers and doctoral programs.

In addition, the following new master's level graduate courses have been added to

enhance student learning and preparation for the real world.

CPSC 5270 - Advanced Database and Database Security

(3) Credit Hours
Advanced concepts and methods in the definition and management of databases, transaction processing and programming in a database environment; topics in access control, database security, database and data auditing, XML access control, trust management and privacy protection, SQL Injection, integrity, recovery and concurrence. Prerequisites: CPSC 5210, CPSC 5590, or CPSC 5800 or department head approval.

CPSC 5300 - Research Methodologies and Practice

(3) Credit Hours
Students will learn, the practice, and master research methodologies used in computer science and engineering. The course will cover topics ranging from the principles of experiment design, statistics, to various aspects of reading, writing, evaluating papers, and presenting research. There will be assignments during the semester allowing the students to practice different research skills and methodologies covered in the lectures. There will be a semester-long project in which students select, design, and execute research projects and present the result at the end of the semester. Prerequisites: CPSC 5210, CPSC 5590, or CPSC 5800 or department head approval.

To increase the flexibility of the MS Computer Science program, courses in the curriculum are offered in all three modalities: asynchronous, face-to-face, and hybrid. It is now possible for students to earn the MS Computer Science degree completely online.

2.2. Course Scheduling and Offerings

The curriculum has been designed to be flexible and convenient with courses offered regularly, enabling students to make timely progress towards their degrees. Students can finish their master's degrees in computer science in two years by taking three courses per semester. It may be possible to finish more quickly by taking an additional fall or spring course, or by taking a summer course(s), subject to availability. At least two Computer Science core courses, one Cyber Security course, and one Data Science course, plus multiple elective courses, are offered each fall and spring semester, in addition to the Thesis and Project courses. Graduate Internship is offered on demand. Table 2.1 shows the courses that have been offered in the past two years.

Table 2.1. Graduate Computer Science Courses Offered in the Last Two Years.

Course Enrollment* offered in Past Two Years								
COURSE INFORMATION			ACADEMIC YEAR 2020-2021			ACADEMIC YEAR 2021-2022		
NO.	TITLE	CREDIT HOURS	SUMMER	FALL	SPRING	SUMMER	FALL	SPRING
5000	Fund. of Computer Science	3	X	x	X	X	X	X
5010	Structuring Progs & Data	3		X			X	X
5020	Computing Systems	3			X			X
5100	Theory of Computer Prog Lang	3		X			X	
5110	Mobile Computing	3				X		
5130	Intro to Cloud Computing	3				X		
5200	Automata, Complex & Computability	3		X		X	X	
5210	Design & Anal. of Comp. Algorithms	3		X			X	
5220	Advanced Database Systems	3			X			X
5240	Principles of Data Analytics	3		X				X
5260	Computer Network Security	3						X
5440	Intro to Machine Learn	3			X			X
5460	Pattern Recognition	3			X			X
5530	Data Visualization & Exploration	3		X			X	
5550	Client-Server Systems	3		X			X	
5600	Adv. Biometrics & Cryptography	3			X			X
5660	Sys Vulnerability Anal & Audit	3		X			X	
5670	Database Security & Auditing	3		X			X	
5680	Computer Forensics	3						
5700	Advanced Computer Architecture	3			X			X
5800	Adv. Topics in System Software	3			X			X

5900	Project	3	X	X	x	X	X	X
5910R	Special Topics: Wireless Security	3						
5920R	Grad. Internship in Computer Sci.	1	X	X	X	X	X	X
5997R	Individual Studies	3	X	X	X	X	X	X
5999R	Thesis	1-6	X	X	X	X	X	X
7999R	Dissertation	3						X

2.3. Comparison with Similar Undergraduate Courses

The MS Computer Science program curriculum includes academic content that builds off the fundamentals taught in undergraduate courses. In such cases, graduate coursework delves deeper into the conceptual points of the field. Students are encouraged to spend time on key derivations rather than focusing solely on outcomes as a way of illustrating methods they will find useful. The syllabi for the graduate courses CPSC 5700 – Advanced Computer Architecture, CPSC 5180 – Programming Languages for Advanced Data Analytics, and CPSC 5100 – Theory of Computer Programming Languages, along with the syllabi of corresponding undergraduate courses, are provided in Appendices G and H as examples.

2.4. Alignment with Learning Outcomes

As can be seen in Tables 1.2, 1.3 and 1.4 in the previous section, the MS Computer Science program has clear student learning outcomes that align with the program's learning outcomes.

2.5. Curriculum Structure

A. Computer Science Program Curriculum Samples

Below are examples of the graduate program curricula for the three Computer Science concentrations. Additional details, as well as course descriptions, can be found in the Graduate Catalog at https://catalog.utc.edu/index.php.

Computer Science: Computer Science, M.S.

Computer Science Core Courses

15 hours; choose 5 of the 7 courses shown

- CPSC 5100 - Theory of Computer Programming Languages
- CPSC 5210 - Design and Analysis of Computer Algorithms
- CPSC 5260 - Introduction to Parallel Algorithms
- CPSC 5410 - Model Analysis and Simulation
- CPSC 5590 - Advanced Computer Networks
- CPSC 5700 - Advanced Computer Architecture
- CPSC 5800 - Advanced Topics in Systems Software
- Total: 15 hours

Computer Science Elective Courses

- CPSC 5110 - Mobile Computing
- CPSC 5120 - Software Project Management
- CPSC 5130 - Cloud Computing
- CPSC 5140 - Design of Distributed Systems
- CPSC 5150 - Design of Web Interfaces
- CPSC 5160 - Structured Data Exchange
- CPSC 5170 - User Interface Development
- CPSC 5200 - Automata, Complexity, and Computability
- CPSC 5230 - Decision Support and Business Intelligence
- CPSC 5240 - Principles of Data Analytics
- CPSC 5270 - Advanced Database and Database Security
- CPSC 5400 - Topics in Simulation
- CPSC 5410 - Model Analysis and Simulation
- CPSC 5420 - Programming with SAS
- CPSC 5440 - Introduction to Machine Learning
- CPSC 5450 - Advanced Topics in Artificial Intelligence
- CPSC 5460 - Pattern Recognition
- CPSC 5500 - Computer Graphics Applications and Algorithms
- CPSC 5510 - Advanced Computer Graphics
- CPSC 5530 - Data Visualization and Exploration
- CPSC 5560 - Computer Data Communications
- CPSC 5570 - Internetworking
- CPSC 5600 - Advanced Biometrics and Cryptography
- CPSC 5610 - Advanced Information Security Management
- CPSC 5620 - Computer Network Security
- CPSC 5640 - Internet Security Protocols
- CPSC 5660 - System Vulnerability Analysis and Auditing
- CPSC 5680 - Computer Forensics
- CPSC 5710 - Microcomputer Systems Architecture
- CPSC 5720 - Real-Time Embedded Systems

- [CPSC 5820 - Legacy Computing Systems](#)
- [CPSC 5850 - Compiler System Design](#)
- [CPSC 5910r - Special Topics](#)
- [CPSC 5920r - Graduate Internship in Computer Science](#)
- [CPSC 5997r - Individual Studies](#)
- Total 12 hours (thesis option) or 18 hours (project option)

Project or Thesis

- [CPSC 5900 - Project](#) **(3 hours)**
- or
- [CPSC 5999r - Thesis](#) **(6 hours)**

Computer Science: Data Science, M.S.

Computer Science Core Courses

15 hours; choose 5 of the 7 courses shown

- [CPSC 5100 - Theory of Computer Programming Languages](#)
- [CPSC 5210 - Design and Analysis of Computer Algorithms](#)
- [CPSC 5260 - Introduction to Parallel Algorithms](#)
- [CPSC 5410 - Model Analysis and Simulation](#)
- [CPSC 5590 - Advanced Computer Networks](#)
- [CPSC 5700 - Advanced Computer Architecture](#)
- [CPSC 5800 - Advanced Topics in Systems Software](#)

Data Science Core Courses

At least 6 hours of Data Science Core Courses:

- [CPSC 5180 - Programming Languages for Advanced Data](#)
- [CPSC 5240 - Principles of Data Analytics](#)
- [CPSC 5440 - Introduction to Machine Learning](#)
- [CPSC 5530 - Data Visualization and Exploration](#)

Plus at least 6 hours chosen from one of five Data Science areas:

- **MATH AREA**
- [MATH 5130 - Introduction to Probability and Statistics](#)
- [MATH 5140 - Mathematical Statistics](#)
- [MATH 5150 - Introduction to Biostatistics](#)
- [MATH 5160 - Applied Statistical Methods](#)

- **BUSINESS AREA**
- MGT 5180 - Prescriptive Analytics
- MGT 5190 - Data Mining and Analytics
- MGT 5200 - Advanced Data Analytics

- **BIOLOGY AND ENVIRONMENTAL SCIENCE AREA**
- ESC 5120 – Applied Statistics for Environmental Scientists
- ESC 5610 - Advanced Applications of Remote Sensing and Geographic Information Systems
- ESC 5660 - Geographic Information Systems

- **ENGINEERING MANAGEMENT AREA**
- ENGM 5040 - Decision Making and Optimization Techniques
- ENGM 5520 - Reliability Engineering
- ENGM 5580 - Advanced Engineering Economy
- ENGM 5850 - Technical Innovation

- **CYBER SECURITY AREA**
- CPSC 5270 - Advanced Database and Database Security
- CPSC 5600 - Advanced Biometrics and Cryptography
- CPSC 5610 - Advanced Information Security Management
- CPSC 5620 - Computer Network Security
- CPSC 5660 - System Vulnerability Analysis and Auditing
- CPSC 5680 - Computer Forensics

Unrestricted Electives

Requires 6 if the Project option is chosen

- **PROJECT OR THESIS**
- CPSC 5900 - Project (**3 hours**)
- or
- CPSC 5999r - Thesis (**6 hours**)

Computer Science: Cyber Security, M.S.

Computer Science Core Courses

15 hours; choose 5 of 7 courses shown; Cyber Security must include CPSC 5590

- CPSC 5100 - Theory of Computer Programming Languages
- CPSC 5210 - Design and Analysis of Computer Algorithms
- CPSC 5260 - Introduction to Parallel Algorithms
- CPSC 5410 - Model Analysis and Simulation
- CPSC 5590 - Advanced Computer Networks

- CPSC 5700 - Advanced Computer Architecture
- CPSC 5800 - Advanced Topics in Systems Software
  Total: 15 hours

Cyber Security Core Courses

- CPSC 5620 - Computer Network Security
- CPSC 5680 - Computer Forensics
- Total: 6 hours for Cyber Security concentration

Elective Hours

Thesis option:
- 3 hours of Cyber Security elective courses and 3 hours of Computer Science elective courses

Project option:
- 6 hours of Cyber Security elective courses and 6 hours of Computer Science elective courses

Cyber Security Elective Courses

- CPSC 5140 - Design of Distributed Systems
- CPSC 5270 - Advanced Database and Database Security
- CPSC 5600 - Advanced Biometrics and Cryptography
- CPSC 5610 - Advanced Information Security Management
- CPSC 5640 - Internet Security Protocols
- CPSC 5660 - System Vulnerability Analysis and Auditing

Computer Science Elective Courses

- CPSC 5110 - Mobile Computing
- CPSC 5120 - Software Project Management
- CPSC 5130 - Cloud Computing
- CPSC 5140 - Design of Distributed Systems
- CPSC 5150 - Design of Web Interfaces
- CPSC 5160 - Structured Data Exchange
- CPSC 5170 - User Interface Development
- CPSC 5200 - Automata, Complexity, and Computability
- CPSC 5230 - Decision Support and Business Intelligence
- CPSC 5240 - Principles of Data Analytics
- CPSC 5400 - Topics in Simulation
- CPSC 5410 - Model Analysis and Simulation
- CPSC 5420 - Programming with SAS
- CPSC 5440 - Introduction to Machine Learning
- CPSC 5450 - Advanced Topics in Artificial Intelligence
- CPSC 5460 - Pattern Recognition
- CPSC 5500 - Computer Graphics Applications and Algorithms

- CPSC 5510 - Advanced Computer Graphics
- CPSC 5530 - Data Visualization and Exploration
- CPSC 5560 - Computer Data Communications
- CPSC 5570 - Internetworking
- CPSC 5710 - Microcomputer Systems Architecture
- CPSC 5720 - Real-Time Embedded Systems
- CPSC 5820 - Legacy Computing Systems
- CPSC 5850 - Compiler System Design
- CPSC 5910r - Special Topics
- CPSC 5920r - Graduate Internship in Computer Science
- CPSC 5997r - Individual Studies
- Total: 9 hours

Project or Thesis

- CPSC 5900 - Project **(3 hours)**
- or
- CPSC 5999r - Thesis **(6 hours)**

2.6. Research and Professional Practice

The MS Computer Science program engages students in professional practices and training experiences by offering a variety of seminars, local internship opportunities, and job fairs throughout the year. Students are informed of these via e-mail, bulletin boards, and e-boards. In addition, theses and projects also act as professional practice resources and vehicles for students to pursue research. Many students work with faculty on funded research projects.

2.7. Online and In-Class Parity

As mentioned earlier, some Computer Science graduate courses are offered in three modalities: face-to-face, asynchronous online, and hybrid. All courses have a presence on Canvas (online learning management system), branded as *UTC Learn*. To ensure progress and achievements are on par regardless of the modality used, students are encouraged, and sometimes required, to participate regularly in discussion forums to fulfill their class participation goals and make sure they keep up with course material. Face-to-face and online students are given assignments and exams of equivalent difficulty; program integrity and rigor are maintained regardless of the modality.

2.8. Pedagogical Methods

In-person graduate courses are offered at a variety of times (mid-day, late afternoon, evening) to accommodate working students as well as those who are full-time on campus. As mentioned above, many courses are offered in an online format; it is possible to complete the master's degree fully online.

Part III. Student Experience

3.1. MS Computer Science Program Enrollment and Peer Identification

It is important for students to identify with peers during their studies as it contributes to a positive learning experience and promotes team-building skills. Peer study groups facilitate understanding of course materials and assignments. The integrated nature of UTC's MS Computer Science program is designed to create an appropriate environment for peer interaction through a variety of activities, such as group projects, computer science clubs, and professional student chapters like Association for Computing Machinery (ACM). Within most courses, students are arranged into groups to complete assignments and projects collaboratively. In addition, students are encouraged to join on-campus clubs, professional organization student chapters, and student bodies such as the Graduate Student Association (GSA). These activities will help students connect with peers outside their discipline.

The MS Computer Science program and its concentrations provide online-accessible education in the theory and applications of computer science and prepares students for successful careers in industry, government, and academia. The diverse nature of the concentrations helps students apply tools and techniques in computing sciences through individual and team-based projects and promote life-long learning and service to the computer science profession. The program objectives are to produce graduates who:

- Function as successful professionals in computer science

- Function effectively in multidisciplinary environments

- Adapt to various environments

- Participate in further knowledge building opportunities

A. Admission Requirements

Applicants must meet the requirements below to be admitted to the MS Computer
Science program at UTC:

- Hold a baccalaureate degree from a regionally accredited college or university
  or foreign equivalent;

- Have a minimum cumulative grade point average (GPA) of 2.7 on a 4.0 scale
  or a 3.0 in the senior year (international students, and domestic students
  without a previous degree in the computing discipline, are admitted based on
  a minimum GPA of 2.9 *or* a 3.2 in the senior year);

- International students must have a minimum score of 83 on the Internet-based
  TOEFL *or* 6.5 on the IELTS;

- Submit official transcripts from each institution previously attended; and

- Complete the Graduate School application form and pay a non-refundable fee.

It should be noted that the required GPA and English proficiency scores for international
applicants to the MS Computer Science program are higher than the Graduate School's
minimum requirements of 2.7 GPA (or 3.0 senior year) and 79 TOEFL/6.0 IELTS. The more
stringent admission requirements for international students went into effect in 2018. The
increased requirements were proposed by program faculty due to concerns regarding the
admission of students who were not sufficiently prepared to succeed in the program. In
particular, international students admitted to the program often had difficulty presenting
technical information and/or writing technical papers in English. The changes to the program
admission requirements have resulted in the admission of better qualified students without

sacrificing enrollment levels or the number of degrees awarded (see section C, Enrollment, and section D, Degrees Awarded, below).

B. Recruitment

Students are primarily recruited into the Computer Science master's program through the CSE department web site (https://www.utc.edu/college-engineering-computer-science/programs/computer-science-engineering/ or www.utc.edu/cse) and word-of-mouth referrals from current students and alumni. There are some limited marketing efforts via the Graduate School, including an annual graduate school admissions fair attended by representatives of the faculty. This past year one faculty member from the college went to two recruitment visits, one in the Middle East and another in Africa, where we have started getting an increasing number of students. We also have contacts with a number of local employers, several of whom are on the department's Industrial Advisory Board; this can assist with recruiting potential students who wish to further their education while working with those organizations. Despite the paucity of organized recruiting efforts, graduate program enrollment has been stable for several years (see the following section).

C. Enrollment

Table 3.1. MS Computer Science Program Enrollment Data*
Source: Office of Planning, Evaluation, and Institutional Research.

Table 3.1. MS Computer Science Program Enrollment Data					
Gender	**Fall 2018**	**Fall 2019**	**Fall 2020**	**Fall 2021**	**Fall 2022**
Female	16	17	17	16	13
Male	43	41	46	40	39
Total	59	58	63	56	52

D. Degrees Awarded

The number of degrees awarded in the MS Computer Science Program over the years has gradually increased slightly, with some year-to-year fluctuation. Table 3.2 shows the numbers of degrees awarded between 2018 and 2022.

Table 3.2. MS in Computer Science Degrees Awarded per Fiscal Year*
Source: Office of Planning, Evaluation, and Institutional Research.

2017-18	2018-19	2019-20	2020-21	2021-22
15	14	17	15	17

3.2. Quality Evaluation

Students have the opportunity to provide feedback on their learning and courses and evaluate faculty teaching effectiveness through surveys conducted online prior to final exams each semester. Students are routinely notified through e-mail and by the instructors in class to log on and complete the survey. The survey results are available to the faculty member teaching each course and to the Department Head, who reviews them and addresses any areas of concern with faculty as part of the Evaluation and Development by Objectives (EDO) process.

3.3. Professional Development Opportunities

The MS Computer Science program provides adequate professional development opportunities through membership in professional associations such as CompUTC, Girls in Computer Science (GiCS), the Graduate Student Association (GSA), the Society of Woman Engineers (SWE), etc. These organizations encourage students to attend conferences and workshops, help students network and find jobs, and provide students with opportunities for publication.

The CECS Center for Student Success provides free resources to assist students in finding employment opportunities in line with their qualifications. Its mission is to provide students with tools to be successful in their job search and to be prepared with the right documents for an interview. Among other career development opportunities (https://www.utc.edu/college-engineering-computer-science/center-for-student-success/career-development.php), the College of Engineering and Computer Science organizes career fairs twice per year, one in the fall and one in the spring, to assist students in finding jobs.

3.4. Enrichment Opportunities

To provide adequate enrichment opportunities, the MS Computer Science program hosts a variety of seminars conducted by local professional speakers from the Tennessee Valley Authority (TVA), Volkswagen (VW), Blue Cross Blue Shield of Tennessee, UNUM, Erlanger Hospital, etc. These seminars, offered free and situated conveniently in UTC auditoriums, create an environment that facilitates student engagement with local industries and enriches students' education.

3.5. Diverse Perspectives

The MS Computer Science program aims to expose students to various perspectives and experiences throughout the program. Field trips to TVA, VW, the Electric Power Board (EPB), Amazon, McKee Foods Corp., and others are held regularly to introduce students to various work environments. Guest speakers from these companies and many others are brought into the classroom by professors every semester to impart practical knowledge and provide opportunities for discussion.

3.6. Academic Support

The availability of instructional resources improved significantly with the opening of the new UTC Library building in January, 2015. The program's instructional equipment and facilities within CECS are appropriate to our teaching and research needs. The classrooms and instructional laboratories have state-of-the-art technology including recently upgraded podiums and projection equipment, and a variety of laboratories in the College increase learning and research opportunities for graduate students.

Graduate students have access to a College study room on the second floor (EMCS 241), which provide a quiet study environment. Technical support is provided by technical personnel staffed by CECS (https://www.utc.edu/cecs-tech), along with graduate assistants and other student workers, backed up by the University's IT Help Desk (https://www.utc.edu/information-technology).

Part IV. Faculty

4.1 Computer Science Graduate Faculty

The Computer Science and Engineering Department has 11 tenured and tenure-track faculty and 4 non-tenured faculty members. Table 4.1 lists the current faculty in the department of Computer Science and Engineering along with their rank and tenure status.

Table 4.1 Computer Science and Engineering Faculty

Faculty	Rank	T/T-T
Dr. Joseph Dumas	P	T
Dr. Mina Sartipi	P	T
Dr. Hong Qin	P	T
Dr. Yu Liang	P	T
Dr. Joseph Kizza	P	T
Dr. Yukun Yuan	Assist. P	TT
Dr. Dalei Wu	Assoc. P	T
Dr. Mengjun Xie	Assoc. P	T
Dr. Yingfeng Wang	Assoc. P	TT
Dr. Anthony Skjellum	P	T
Dr. Li Yang	P	T
Dr. Chang Phuong	Lecturer	Non TT
Dr. Deborah Mudali	Lecturer	Non TT
Mr. Roland Howell	Lecturer	Non TT
Mr. Eisa Mohamed	Lecturer	Non TT

All 11 tenured/tenure-track faculty members are qualified to teach graduate-level courses and advise graduate students. Non-tenure-track faculty with doctorates may also be approved to teach specific graduate courses or serve on graduate committees. The expenditures on behalf of the faculty are provided in Appendix A.

The CSE Department has graduate program coordinators who are responsible for the graduate concentrations at each level (master's and doctoral). Short background information for the Computer Science graduate program coordinators is as follows:

Dr. Mina Sartipi is the coordinator of the Computer Science concentration within the Ph.D. program in Computational Sciences. Dr. Sartipi is a Guerry Foundation Professor in the Department of Computer Science and Engineering. She received her B.S. in Electrical Engineering from the Sharif University of Technology (2001) and her M.S. (2003) and Ph.D. (2006) degrees in Electrical and Computer Engineering from Georgia Tech. She is a Program Leader for Urban Science & Technology at UTC. She also serves as the Director of the Center for Urban Informatics and Progress (CUIP). CUIP leverages UTC's expertise in data science (data analytics and data management) and wireless communications in smart city applications such as transportation, health, and energy. More specifically, CUIP focuses on research in Urban Science and Urban Analytics, Data Acquisition and Compressive Sensing, Data Integration, Data Interoperability, Big Data Analytics, Smart Health, Smart Grid, Intelligent Transportation, Information Processing for Wireless Sensor Networks, Cyber-Physical Systems (CPS), Modern Error Control Coding and Information Theory, and Signal Processing and Wavelet Transforms.

Dr. Yu Liang is a Professor in the Department of Computer Science and Engineering, and is the coordinator of the MS Computer Science program. Dr. Liang has a B.Eng. in Computer Science and Technology from Tsinghua University (1990), a M.Eng. in Computer

Science from Beijing University of Technology (1995), a Ph.D. in Computer Science from the Chinese Academy of Sciences (1998), and a Ph.D. in Applied Mathematics from the University of Ulster (2005). Dr. Liang has been on the UTC faculty since 2013 (promoted to full Professor in 2020) and previously served as an Assistant/Associate Professor at Central State University (2007-2013). He has published a book, four book chapters, and approximately 100 peer-reviewed journal and conference papers, and has been awarded over $3 million in grant funding. His areas of interest include numerical linear algebra, modeling and simulation, data analytics, parallel and distributed computing, and sensor-oriented information processing and analysis.

The main responsibilities of the graduate coordinators are to advise graduate students, review all prospective graduate students' applications, recruit graduate students to their concentrations, write and propose all graduate curriculum changes, teach graduate-level courses, and serve on thesis/dissertation committees. In addition to the program coordinators, the CSE Department has three research center directors: Dr. Mina Sartipi – Director, Center for Urban Informatics and Progress; Dr. Anthony Skjellum – Director, SimCenter and Computational Sciences; and Dr. Li Yang – Director, UTC InfoSec Center. Dr. Yang is currently on rotation as a Program Director for the National Science Foundation (NSF). One program coordinator represents the Computer Science graduate programs on the Graduate Council.

4.2. Faculty Teaching Load

Most graduate level courses, on-campus and online, are taught by full-time graduate faculty in the CSE Department. For the MS Computer Science program, faculty teaching loads are aligned with the highly individualized nature of graduate instruction. In the case of graduate projects and theses, professors with specialized knowledge in each student's area of study are

available to guide the student on an individual basis. Table 4.2 shows the average student credit hour (SCH) production per various full-time equivalent (FTE) faculty categories generated by a university faculty member, a CECS faculty member, and the department's faculty members for each fall semester for four years starting in 2018.

Table 4.2. SCH/FTE Faculty/Fall Semester/Year				
		UTC	**College**	**Department**
2018	Adjunct	315	197	319
	NTT	253	148	283
	T/TT	219	187	255
	Total	**251**	**178**	**255**
2019	Adjunct	337	201	357
	NTT	278	147	306
	T/TT	222	153	226
	Total	**264**	**159**	**269**
2020	Adjunct	306	355	365
	NTT	319	145	348
	T/TT	225	162	229
	Total	**261**	**180**	**264**
2021	Adjunct	362	288	436
	NTT	277	166	297
	T/TT	249	194	271
	Total	**276**	**201**	**271**
Key: T: Tenured Faculty / TT: Tenure-Track Faculty / NTT: Non Tenure-Track Faculty				

4.3. Faculty Diversity

Students enrolled in the MS Computer Science Program are increasingly diverse. Studies have shown the importance of faculty diversity to enrolling and retaining students from diverse backgrounds. CSE faculty members reflect the ethnic and gender diversity of our student body and have demonstrated a positive impact in shaping campus culture and encouraging students from multiple minority groups and both genders to enroll and persist through graduation. The diverse nature of faculty and graduate major enrollment is presented in Appendix B.

4.4. Faculty Professional Development

The MS Computer Science faculty strive for continuous professional development, which can advance teaching methods, scholarship, and practice. Ongoing, current and past research projects led by faculty members have in many cases been funded externally through grants and awards. Program faculty regularly attend annual conferences, workshops, expos, meetings, and a multitude of professional organization meetings. Example *Curriculum Vitae* of selected MS Computer Science faculty are shown in Appendix F. Other CVs are available upon request; brief faculty profiles can be viewed online at https://www.utc.edu/engineering-and-computer-science/academic-programs/computer-science-and-engineering/faculty-and-staff.

4.5. Improvement Processes

The faculty actively engages in regular planning, evaluation, and improvement activities that measure and advance student success. To enrich and improve the curriculum, which is maintained at the department level, faculty members may propose changes including curriculum, program goals, and an overall assessment process based on feedback from students and inputs

during departmental meetings. The department reviews the proposal and, if approved, submits it to the graduate coordinator committee. The committee then reviews and approves the proposed changes. Once approved, the university implements the changes in the following academic year.

4.6. Faculty Evaluation

The program uses an appropriate process to incorporate the faculty evaluation system explained in detail in Chapter 3 of the Faculty Handbook (http://www.utc.edu/faculty-senate/handbook.php). Generally, department heads rate their faculty based on overall performance. The annual Evaluation and Development by Objectives (EDO) process is the main tool used to assess faculty at UTC. The process measures quality of teaching, research, and service. The annual EDO evaluation process consists of objectives, performance reports, and evaluation. The EDO form used for faculty evaluation can be found at https://www.utc.edu/academic-affairs/digital-measures/edo-performance-and-planning. The department head's EDO sample format can be found at https://www.utc.edu/arts-and-sciences/department-head-resources.

<center>**Part V. Learning Resources**</center>

5.1. Equipment and Facilities Evaluation

The department has four dedicated computer laboratories (EMCS 220, EMCS 306, EMCS 312, and EMCS 321); in addition, the department also runs a fully equipped UTC InfoSec Center for the Cyber Security program (EMCS 323). CECS and the university, in addition, offer a variety of other labs that students can use. For all our labs, CECS regularly evaluates its facilities and equipment and makes improvements where necessary. For example, the College is committed to creating an environment that places personal safety and health of the students and faculty first by regularly evaluating laboratories. The College's safety manual describes policies and procedures that govern access to labs, including handling of hazardous materials, inspection, and inventory control. Anyone accessing the labs to use equipment or handle materials within the college must follow accepted procedures and adhere to the published policies, which are easily accessible by students and faculty. The Laboratory Safety Manual can be viewed at

https://www.utc.edu/sites/default/files/2021-11/CECS%20Lab%20Safety%20Manual.pdf.

5.2. Learning and Information Resources

Students and faculty have access to information resources to support teaching and learning, not only within CECS, but also in other locations across campus including the UTC Library. Additionally, the Walker Center for Teaching and Learning supports faculty by offering development sessions and other teaching resources. Section 5.3 provides more information on the Walker Center, and the following subsections provide information on the UTC Library.

A. UTC Library General Information

The mission of the UTC Library is to contribute to the intellectual endeavors of the UTC community by assisting in the discovery of information and providing the infrastructure and

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resources for learning. The Library has 25 faculty librarians and 18 staff specialists to support the UTC community. The total Library budget for 2022 was nearly $4.8 million.

UTC opened its current library building in January, 2015. This 184,725 square foot facility is open 113.5 hours per week during the academic semester and combines traditional library services like reference, research assistance, and circulation with cutting-edge amenities like the Studio (featuring recording space, high-spec computing hardware and software, 3D modeling and printing, and video/audio equipment circulation). Furthermore, the library houses important student and faculty service points including the Center for Advisement, the Writing and Communication Center, and the Walker Center for Teaching and Learning. The library also boasts 37 group study rooms, 2 practice presentation rooms, 8 conference rooms, and a computer lounge with access to 142 Windows and 36 Macintosh computers. Finally, the library houses unique and historical book and manuscript collections, the University Archives, and the permanent University art collection within a climate controlled state-of-the-art Special Collections facility. The new UTC Library page at https://www.utc.edu/library/about/building/ provides more detailed information on features of the library and services offered. An informational sheet is also available in Appendix D. Additional information about the UTC Library is available at http://www.utc.edu/library.

B. Library Collections and Services 2021-2022

As of June 30, 2022, the Library had available 118,230 journal titles, including open access titles, through subscriptions to full-text resources, databases, journal packages, and individual journals. In total, the library spent $1,290,440 on all ongoing serial and database subscriptions in FY2022 and the UTC community accessed these electronic resources 419,847 times in FY2022.

C. Library Support of Computer Science and Engineering Department

Many core journal titles for Computer Science are made available through large multidisciplinary journal packages and databases without an impact on the direct budget allocation for Computer Science. In support of the Computer Science programs, the library makes available 5,221 related print and electronic journals and 1,818 electronic proceedings. A list of electronic, peer reviewed journals supporting Computer Science students and faculty is available in Appendix E. Computer Science students and faculty also have access to several large, multidisciplinary full text journal packages and databases to support their scholarship. In support of Computer Science, the Library spent $27,428 in FY2022 for ongoing serial and subscription resource purchases, as part of the $307,143 spent supporting the College of Engineering and Computer Science (CECS).

FY2022	Computer Science and Engineering	UTC Library Total
# of Journals – Print + Digital & electronic proceedings	7,039	118,230
$ Spent on ongoing serial and database subscriptions	$307,143 (includes all college-level purchases for CECS)	$1,290,440

Databases

The UTC Library provides access to electronic resources with the following databases supporting Computer Science: the Association of Computing Machinery (ACM) Digital Library, the Computer Science Database, Springer Ebooks, and the IEEE/IET Electronic Library. In addition, the Library makes available numerous multidisciplinary databases such as Web of Science, Science Direct, ProQuest Central, OmniFile Full Text Mega, Academic OneFile, and JSTOR to supplement subject-specific resources. Access to thousands of online full-text journals is also available through packages from top publishers like Springer/Nature, Taylor and Francis,

Sage, Wiley, and Elsevier. The Library also offers interlibrary load (ILL) and Document

Delivery services at no cost to students and faculty for materials not owned or accessible through

the UTC Library. Patrons can easily submit requests through the library's online account

management system, which also allows them to track the progress and status as well as receive e-

mail notifications for arrival of materials.

See Appendix E for a sample listing of Computer Science journals available in the UTC

Library. A comprehensive list of journals is available upon request. For further details of the

Library support to the Computer Science and Engineering department, please visit:

https://wikilib.utc.edu/images/9/99/FY23_UTC_Library_Support_for_Computer_Science.pdf.

5.3. Materials and Support Staff

The MS Computer Science program provides adequate materials and support staff to

encourage research and publication. The Walker Center for Teaching and Learning promotes

excellence in teaching, learning and the use of technology through dialogue, inquiry, and

research. To fulfill these goals, the Center maintains a trustworthy environment to those it serves.

The Center also offers faculty feedback and opportunities for reflection on their teaching. Please

visit https://www.utc.edu/walker-center-teaching-learning/ for more information.

Part VI. Support

6.1. Operating Budget

The MS Computer Science program's internal and external support are consistent with the budget needs of the program. Table 6.1 shows the external grants received by the faculty in the department. Appendix A shows the operating budget for the College.

Table 6.1. External Grants (Funded Proposals, FY 2018 through FY 2022)

	FY2018	FY2019	FY2020	FY2021	FY2022
External Funding Award Amounts	12,353,058	5,843,829	3,144,892	3,748,456	8,766,509

6.2. Enrollment and Effectiveness

Enrollment and graduation rates are key components of accountability at UTC. A high-quality experience has been integrated throughout the graduate program in order to maintain high enrollment rates. Faculty build strong relationships with students through smaller classes and one-on-one meetings, and serves as primary mentors of students. The faculty also encourages local industries to hire MS program students, enabling the maintenance of a high student enrollment and retention rates. Please see Section 3.1 for recruitment details and enrollment numbers.

6.3. Program Responsiveness

The MS Computer Science program is responsive to changing local, state, regional and national needs. As mentioned in Section 2.1, the curriculum contents are reviewed regularly, partly to respond to changing regional needs. The new Data Science concentration, launched in

fall 2016, is an example of such response to a changing business environment and student population. The curriculum is designed to provide students with the needed knowledge and skills to function effectively in the "big data" field.

Since the last program review, a strategic plan for the College of Engineering and Computer Science has been under development to further propel the responsiveness of programs it contains, including the MS Computer Science Program. This strategic plan will take effect for the 2022-2027 period and can be seen at https://www.utc.edu/sites/default/files/2022-05/CECS-Strategic-Plan-22-27.pdf

6.4. Graduate Student Data Collection and Placement Evaluation

Graduate students are connected to the College of Engineering and Computer Science's LinkedIn page (https://www.linkedin.com/groups/6715787) upon graduation. The LinkedIn page helps the College stay connected with alumni and track where they currently work. Since 2015, the College has also completed an Annual Review, which is distributed to all alumni in addition to local and regional businesses. The latest review can be found at https://www.utc.edu/engineering-and-computer-science/about/annual-reviews.

6.5. Procedure Review

The MS Computer Science program's procedures are regularly reviewed to ensure alignment to institutional policies and mission. This is done every year to comply with and maintain the standards contained in the guidelines of the Southern Association of Colleges and Schools Commission on Colleges (SACSCOC), the recognized regional accrediting body in the eleven U.S. southern states.

Appendix A. Expenditures

Table 8. Expenditures						
	2017-18[1]	**2018-19[1]**	**2019-20[1]**	**2020-21[1]**	**2021-22**	**2022-23**
Actual Expenditures[2]	$796,150	$782,571	$836,274	$903,935	$929,203	$1,109,017
Fall Adjunct Salaries[2]	$22,200	$36,600	$50,800	$41,250	$48,000	$88,542.35
Spring Adjunct Salaries[2]	$27,600	$67,450	$45,800	$45,250	$28,500	$92,667.32
FT Faculty FTE[2]	9.5	9.5	10.5	10.5	11.5	
Total Major Enrollment	28	34	41	48	49	
Fall SCH[3]	220	222	256	257	296	
Spring SCH[3]	246	196	295	291	352	
Expenditures per FT Faculty FTE	$89,047	$93,329	$88,845	$94,327	$6,652	$65,250
Expenditures per Student Major	$30,212	$26,077	$22,753	$20,634	$1,561	
Expenditures per SCH	$1,815	$2,121	$1,693	$1,807	$118	

Appendix B. Diversity

<table>
<tr><td colspan="2">**Table 9.** Diversity of Faculty and Graduate Major Enrollment

Fall 2022</td></tr>
</table>

	Student
Multiple Races	1
Unknown	0
American Indian	0
Asian	2
Hispanic	3
Native Hawaiian or Other Pacific Islander	0
African American	6
White	27
Total	**52**

Faculty		
	Female	**Male**
Multiple Races		
Unknown		
American Indian		
Asian	1	6
Hispanic		
African American	1	2
White	1	3
Total	**3**	**11**

Appendix C: Course Assessment Samples

Students' artifacts used in all these sample course assessments is available for review on the department's OneDrive folder.

A. CPSC 5100 (Outcomes 1 and 2)

Computer and Engineering Course Assessment Sheet:
CPSC 5100 – Theory of Computer Programming Languages

Outcome 1: Definition of the Outcome:
Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.

Course Number and Name of the Course:

CPSC 5100 - Theory of Computer Programming Languages

Catalog description of the course:

Theory and design of computer language systems including the formal theory of syntax, semantics of algorithmic languages, language classification, and a survey of procedure and problem oriented computer programming languages. Prerequisite: CPSC 5000 or placement, or department head approval. Standard letter grade. Differential Course Fee will be assessed.

Competencies to measure Outcome 1:

- Demonstrate knowledge of and use algorithms. (5100)
- Ability to solve a problem using algorithms such as recursion, searching, sorting, and graph (5100)

Target: Meets or exceed expectations is equal to or greater than 80%.

Implementation Plan (timeline): Fall 2021
Key/Responsible Personnel: Dalei Wu

Competencies:

- Demonstrate knowledge of and use algorithms. (5100)
- Ability to solve a problem using algorithms such as recursion, searching, sorting, and graph (5100)

Student Artifact Used: Final exam, Question 3:

For the following nested definitions of functions f1 and f2, how is the nesting link of each activation record of the called function set? Here it is assumed that random() function generates a random integer

```
function f1()
{
    int x1;
    function f2()
    {
        int x2 = random();
        if x1 - x2 <=0
            return x1 + x2;
        else
            f2();
    }
}
```

Meets or Above Expectations: 80%

Above Expectations: 56%
Meets Expectations: 24%
Below Expectations: 20%

Results: Target Achievement: Achieved.

Recommendations: *No recommendations are needed.*

Summary of Findings for the outcome:

Meets or Exceeds Expectations: 80% (overall percentage)

Above Expectations: 56% (overall percentage)
Meets Expectations: 24% (overall percentage)
Below Expectations: 20% (overall percentage)

Results: Achieved

Recommendations: *No action necessary.*

Detailed Assessment of
Course Number and Name

Table 1 Course Assessment Plan

Student artifacts (assessment mechanism)	Target Student Outcomes/competencies
Final exam, Question 3	Outcome 1

Table 2 Spreadsheet for Student Performance on Student Artifacts

Stud. Artifact Student ID	Outcome 1 – Analyze and Solve problems Final exam, Question 3
STU01	100
STU02	80
STU03	80
STU04	100
STU05	100
STU06	100
STU07	80
STU08	80
STU09	100
STU10	100
STU11	30
STU12	100
STU13	100
STU14	100
STU15	30
STU16	80
STU17	100
STU18	30
STU19	100
STU20	80
STU21	100
STU22	30
STU23	100
STU24	100
STU25	30

Table 3 Summary of Findings

Objective Letter	
Artifact Rubric score	Outcome 1
	Final exam, Question 3
Total Exceeds	14
Total Meets	6
Total Below	5
Total Students	25
Exceeds %	56
Meets %	24
Below %	20
Total % of Meets and Exceeds for the competency	80
Overall % of Meets and Exceeds for Outcome 1	80

B. CPSC 5680 (Outcomes 3, and 4)

Computer and Engineering Course Assessment Sheet:
CPSC 5680 – Digital Forensics

Outcome 3: Definition of the Outcome: Communicate Efficiently
    Ability to communicate effectively in a variety of professional contexts.

Outcome 4: Definition of the Outcome: Use and Apply Current Information

Recognize professional responsibilities and make informed judgments in
computing practice based on legal and ethical principles

Course Number and Name of the Course:

CPSC 5680 – Digital Forensics

Study on procedures for identification, preservation, and extraction of electronic
evidence. Auditing and investigation of network and host system intrusions, analysis and
documentation of information gathered, and preparation of expert testimonial evidence
will also be covered. Also forensic tools and resources for system administrators and
information system security officers will be explored.

Competencies to measure Outcome 3: Ability to communicate effectively in a variety of
professional context

Lab #2: Hands-on Project 4.1. Page 189.

*Read the four detective reports and the combined affidavit and warrant for
the M57 Patents. Write a two page paper describing the evidence the
police found and explaining whether they had enough information for the
search warrant. Did the information justify taking all the computers and
USB drives? Why or why not?*

Target: Meets or exceed expectations is equal to or greater than 80%.

Implementation Plan (timeline): Fall 2020
Key/Responsible Personnel: Joseph M. Kizza

Meets or Above Expectations:	90.00%
Above Expectations:	80.00%
Meets Expectations:	10.00%

Below Expectations: 10.00%

Results: Target Achievement: Yes

Recommendations: *NA*

Summary of Findings for the outcome:

Meets or Exceeds Expectations: 90.00% (overall percentage)

Above Expectations: 80.00% (overall percentage)
Meets Expectations: 10.00% (overall percentage)
Below Expectations: 10.00% (overall percentage)

Results: Target Achievement: Yes

Recommendations: *NA*

Table 3 Summary of Findings

Objective Letter	
Artifact Rubric score	Outcome 3
	Artifact/question
Total Exceeds	x
Total Meets	x
Total Below	x
Total Students	x
Exceeds %	80.00
Meets %	10.00
Below %	10.00

Total % of Meets and Exceeds for the competency	100.00
Overall % of Meets and Exceeds for Outcome C	90.00

Competencies to measure Outcome 3: Ability to use current techniques, skills, and tools necessary for computing practice

Lab#3: Hands-on Project 5.3, Page 265.

In this project you WinHex to become familiar with different file types. Follow the steps given.

Target: Meets or exceed expectations is equal to or greater than 80%.

Implementation Plan (timeline): Fall 2020
Key/Responsible Personnel: Joseph M. Kizza

Meets or Above Expectations: 100.00%

Above Expectations: 100.00%
Meets Expectations: 0.00%
Below Expectations: 0.00%

Results: Target Achievement: Yes

Recommendations: *NA*

Summary of Findings for the outcome:

Meets or Exceeds Expectations: 100.00% (overall percentage)

Above Expectations: 100.00% (overall percentage)
Meets Expectations: 0.00% (overall percentage)
Below Expectations: 0.00% (overall percentage)

Results: Target Achievement: Yes

Recommendations: *NA*

Table 3 Summary of Findings

Objective Letter	
Artifact Rubric score	Outcome 3
	Artifact/question
Total Exceeds	x
Total Meets	x
Total Below	x
Total Students	x
Exceeds %	100.00
Meets %	0.00
Below %	0.00
Total % of Meets and Exceeds for the competency	100.00
Overall % of Meets and Exceeds for Outcome A	100.00

Competencies to measure Outcome 4: Ability to use and apply current information security concepts and practices (for only the cyber security concentration)

Lab 3: Hands-on Project 6.2. Page 296

In this project you research and download a disk-cleaning and wiping tool and verify that it works. Make sure you are not on a production machine. Do an internet search for disk cleaning and wiping software and download and install at least one tool.

Target: Meets or exceed expectations is equal to or greater than 80%.

Implementation Plan (timeline): Fall 2020
Key/Responsible Personnel: Joseph M. Kizza

      Meets or Above Expectations: 90.00%

      Above Expectations: 80.00%
      Meets Expectations: 10.00%
      Below Expectations: 10.00%

Results: Target Achievement: Yes

Recommendations: *NA*

Summary of Findings for the outcome:

      Meets or Exceeds Expectations: 90.00% (overall percentage)

      Above Expectations: 80.00% (overall percentage)
      Meets Expectations: 10.00% (overall percentage)
      Below Expectations: 10.00% (overall percentage)

Results: Target Achievement: Yes

Recommendations: *NA*

Table 3 Summary of Findings

Objective Letter Artifact Rubric score	Outcome 4
	Artifact/question
Total Exceeds	x
Total Meets	x
Total Below	x
Total Students	x
Exceeds %	80.00
Meets %	10.00
Below %	10.00
Total % of Meets and Exceeds for the competency	90.00
Overall % of Meets and Exceeds for Outcome A	90.00

C. CPSC 5260 (Outcomes 1, 3, 5 and 6)

Computer Science and Engineering Course Assessment Sheet:
CPSC 5260 – Introduction to Parallel Algorithms

Outcome 6:
Definition of the Outcome:
   Apply computer science theory and software development fundamentals to produce computing-based solutions.

Course Number and Name of the Course:

CPSC 5260 – Introduction to Parallel Algorithms

Catalog description of the course: Introduction to parallel and distributed computing; models of parallel computers; parallel programming models; network topologies; performance metrics; theoretical evaluation of algorithms; implementation of candidate algorithms on sample distributed memory and shared memory architectures; background for practical implementation of new algorithms on parallel architectures. Prerequisite: CPSC 5000 or department head approval. (Intermediate knowledge of FORTRAN or C/C++ programming is assumed.) Differential course fee will be assessed.

Competencies to measure Outcome 6:

5) Demonstrate the ability to implement and deliver a software system that meets requirement specification and fulfills through tests. (5410, 5260, 5900/5999)

   Target: Meets or exceed expectations is equal to or greater than 80%.

   Implementation Plan (timeline): Spring 2020
   Key/Responsible Personnel: Dr. Craig Tanis

6) **Competencies:** Demonstrate the ability to implement and deliver a software system that meets requirement specification and fulfills through tests. (5410, 5260, 5900/5999)

   Student Artifact Used:
   Final exam

Meets or Above Expectations:	100.00%
Above Expectations:	81.00%
Meets Expectations:	19.00%
Below Expectations:	0.00%

   Results: Target Achievement: met

Recommendations: *None*

Summary of Findings for the outcome:

Meets or Exceeds Expectations: 100.00% (overall percentage)

Above Expectations: 81.00% (overall percentage)
Meets Expectations: 19.00% (overall percentage)
Below Expectations: 0.00% (overall percentage)

Results: Target Achievement: Met

Recommendations: *None*

Detailed Assessment of
Course Number and Name

Table 1 Course Assessment Plan

Student artifacts (assessment mechanism)	Target Student Outcomes/competencies
Final exam	80

Table 2 Spreadsheet for Student Performance on Student Artifacts

Stud. / Artifact / Student ID	Outcome 6 – …. Final Exam
STU01	Exceed
STU02	Exceed
STU03	Met
STU04	Exceed
STU05	Exceed
STU06	Exceed
STU07	Exceed
STU08	Exceed

STU09	Exceed
STU10	Exceed
STU11	Met
STU12	Exceed
STU13	Exceed
STU14	Exceed
STU15	Met
STU16	Exceed
STU17	Exceed
STU18	Met
STU19	Exceed
STU20	Exceed
STU21	Exceed

Table 3 Summary of Findings

Objective Letter	6
Artifact / Rubric score	Final Exam
	Final exam
Total Exceeds	17
Total Meets	4
Total Below	0
Total Students	0
Exceeds %	81.00
Meets %	19.00
Below %	0.00
Total % of Meets and Exceeds for the competency	100.00

Overall % of Meets and Exceeds for Outcome D	100.00

Computer Science and Engineering Course Assessment Sheet:
CPSC 5260 – Introduction to Parallel Algorithms

Outcome 3:
Definition of the Outcome:

Communicate effectively in a variety of professional contexts.

Course Number and Name of the Course:

CPSC 5260 – Introduction to Parallel Algorithms

Catalog description of the course: Introduction to parallel and distributed computing; models of parallel computers; parallel programming models; network topologies; performance metrics; theoretical evaluation of algorithms; implementation of candidate algorithms on sample distributed memory and shared memory architectures; background for practical implementation of new algorithms on parallel architectures. Prerequisite: CPSC 5000 or department head approval. (Intermediate knowledge of FORTRAN or C/C++ programming is assumed.) Differential course fee will be assessed.

Competencies to measure Outcome 3:

The presentation has a clear purpose and is well organized (5260, 5900/5999

Target: Meets or exceed expectations is equal to or greater than 80%.

Implementation Plan (timeline): Spring 2020
Key/Responsible Personnel: Dr. Craig Tanis

Competencies: Student can present advanced topics in a clear manner.

Student Artifact Used:
Final (virtual) presentation

Meets or Above Expectations: 100.00%

Above Expectations: 0.00%
Meets Expectations: 0.00%
Below Expectations: 0.00%

Results: Target Achievement: met

Recommendations: *None*

Summary of Findings for the outcome:

Meets or Exceeds Expectations: 100.00% (overall percentage)

Above Expectations: 0.00% (overall percentage)
Meets Expectations: 0.00% (overall percentage)
Below Expectations: 0.00% (overall percentage)

Results: Target Achievement: Met

Recommendations: *None*

**Detailed Assessment of
Course Number and Name**

Table 1 Course Assessment Plan

Student artifacts (assessment mechanism)	Target Student Outcomes/competencies
Final presentation	80

Table 2 Spreadsheet for Student Performance on Student Artifacts

Stud. Artifact Student ID	Outcome 3 – …. Final Presentation
STU01	Exceed
STU02	Exceed
STU03	Exceed
STU04	Exceed
STU05	Exceed
STU06	Exceed
STU07	Exceed
STU08	Exceed
STU09	Exceed
STU10	Exceed
STU11	Exceed
STU12	Exceed
STU13	Exceed
STU14	Exceed
STU15	Exceed
STU16	Exceed
STU17	Exceed
STU18	Exceed
STU19	Exceed
STU20	Exceed
STU21	Exceed

Table 3 Summary of Findings

Objective Letter	
Artifact Rubric score	Outcome 3
	Artifact/question
Total Exceeds	21
Total Meets	0
Total Below	0
Total Students	0
Exceeds %	100.00
Meets %	0.00
Below %	0.00
Total % of Meets and Exceeds for the competency	100.00
Overall % of Meets and Exceeds for Outcome C	100.00

Computer Science and Engineering Course Assessment Sheet:
CPSC 5260 – Introduction to Parallel Algorithms

Outcome 6:
Definition of the Outcome:
    Apply computer science theory and software development fundamentals to produce computing-based solutions.

Course Number and Name of the Course:

CPSC 5260 – Introduction to Parallel Algorithms

Catalog description of the course: Introduction to parallel and distributed computing; models of parallel computers; parallel programming models; network topologies; performance metrics; theoretical evaluation of algorithms; implementation of candidate algorithms on sample distributed memory and shared memory architectures; background for practical implementation of new algorithms on parallel architectures. Prerequisite: CPSC 5000 or department head approval. (Intermediate knowledge of FORTRAN or C/C++ programming is assumed.) Differential course fee will be assessed.

7) **Competencies to measure Outcome 6**: Demonstrate the ability to implement and deliver a software system that meets requirement specification and fulfills through tests. (5410, 5260, 5900/5999)

Target: Meets or exceed expectations is equal to or greater than 80%.

Implementation Plan (timeline): Spring 2020
Key/Responsible Personnel: Dr. Craig Tanis

Competencies: Student can apply appropriate techniques and skills to presented problems.

Student Artifact Used:
Final exam

Meets or Above Expectations:	100.00%
Above Expectations:	81.00%
Meets Expectations:	19.00%
Below Expectations:	0.00%

Results: Target Achievement: met

Recommendations: *None*

Summary of Findings for the outcome:

Meets or Exceeds Expectations: 100.00% (overall percentage)

Above Expectations: 81.00% (overall percentage)
Meets Expectations: 19.00% (overall percentage)
Below Expectations: 0.00% (overall percentage)

Results: Target Achievement: Met

Recommendations: *None*

Detailed Assessment of
Course Number and Name

Table 1 Course Assessment Plan

Student artifacts (assessment mechanism)	Target Student Outcomes/competencies
Final exam	80

Table 2 Spreadsheet for Student Performance on Student Artifacts

Stud. Artifact Student ID	Outcome 6 – …. Final Exam
STU01	Exceed
STU02	Exceed
STU03	Met
STU04	Exceed
STU05	Exceed
STU06	Exceed
STU07	Exceed
STU08	Exceed
STU09	Exceed
STU10	Exceed
STU11	Met
STU12	Exceed

STU13	Exceed
STU14	Exceed
STU15	Met
STU16	Exceed
STU17	Exceed
STU18	Met
STU19	Exceed
STU20	Exceed
STU21	Exceed

Table 3 Summary of Findings

Objective Letter	6
Artifact Rubric score	Final Exam
	Final exam
Total Exceeds	17
Total Meets	4
Total Below	0
Total Students	0
Exceeds %	81.00
Meets %	19.00
Below %	0.00
Total % of Meets and Exceeds for the competency	100.00
Overall % of Meets and Exceeds for Outcome D	100.00

D. CPSC 5700

Computer Science and Engineering Course Assessment Sheet: CPSC 5700 – Advanced Computer Architecture

Course Number and Name of the Course: CPSC 5700 – Advanced Computer Architecture

Catalog description of the course: (3) Credit Hours. An advanced course in computer architecture. Topics may include classical uniprocessor architecture, parallel processing architectures, computer arithmetic, instruction sets, control unit design, instruction and arithmetic pipelines, CISC, RISC, superscalar and superpipelined architectures, memory hierarchies, cache and virtual memory mechanisms, and I/O operations. Prerequisites: CPSC 5020 or placement or department head approval. Differential Course Fee will be assessed. Standard letter grade.

Implementation Plan (timeline): Spring semester 2022

Key/Responsible Personnel: Dr. Joe Dumas

Outcome 3: Communicate Efficiently: "Ability to communicate effectively in a variety of professional contexts."

Target: Meets or exceeds expectations is equal to or greater than 80%.

Item Used for Assessment: Final Project report (end-of-semester original paper on a topic related to computer architecture chosen by the student or group of students). Details of the assignment are given in a separate document.

Summary of Findings for Outcome 3:

Meets or Exceeds Expectations: 91.67%

Exceeds Expectations:	0.00%
Meets Expectations:	91.67%
Below Expectations:	8.33%

Results: Target Achievement: Met

Recommendations: In order to help ensure that Outcome 3 continues to be met in future semesters, maintain and uphold English language proficiency requirements for incoming graduate students. Encourage all students (domestic and international) to take advantage of the UTC Library's Writing and Communication Center. It is also noted that the *only* student artifact that failed to

meet expectations was produced by a student who failed the course. It is recommended that the department adopt a policy that artifacts produced by students who receive a D/W/F grade for the course should not be assessed (since those students cannot use the course to satisfy degree requirements).

Summary of Assessment of Student Artifacts:

CPSC 5700 - Spring 2022

Student #	Outcome 3 Final Paper
1	1
2	2
3	
4	2
5	2
6	2
7	2
8	2
9	2
10	2
11	
12	2
13	2
14	2
Average	1.92

1 = Below Expectations
2 = Meets Expectations
3 = Exceeds Expectations

E.   CPSC 5800 (Outcomes 2, 4, and 6)

Computer and Engineering Course Assessment Sheet:
CPSC 5800 - Advanced Topics in Systems Software

Outcome 6: Apply computer science theory and software development fundamentals to produce

computing-based solutions.

Course Number and Name of the Course:

CPSC 5800 - Advanced Topics in Systems Software

Catalog Description: Current topics drawn from the areas of modern operating systems, parallel software, and distributed computing systems. Topics covered may include the theory, design, programming, security, and performance analysis of particular computer systems software. Prerequisite: CPSC 5020 or placement or department head approval. Standard letter grade. Differential Course Fee will be assessed.

8)   **Competencies to measure Outcome 6**: Demonstrate the ability to produce requirement specification, design specification, documenting source codes, and test the developed software system. (5800, 5900/5999)

Target: Meets or exceed expectations is equal to or greater than 80%.

Implementation Plan (timeline): Spring 2021
Key/Responsible Personnel: Michael Ward

9)   **Competencies:** Demonstrate the ability to produce requirement specification, design specification, documenting source codes, and test the developed software system. (5800, 5900/5999)

Student Artifact Used:
Homework 6

Meets or Above Expectations:	100.00%
Above Expectations:	100.00%
Meets Expectations:	0.00%
Below Expectations:	0.00%

Results: Target Achievement: Achieved

Recommendations: *Target Achieved.*

Summary of Findings for the outcome:

Meets or Exceeds Expectations: 100.00% (overall percentage)

Above Expectations: 100.00% (overall percentage)
Meets Expectations: 0.00% (overall percentage)
Below Expectations: 0.00% (overall percentage)

Results: Target Achievement: Achieved

Recommendations: *Target Achieved.*

**Detailed Assessment of
Course Number and Name**

Table 1 Course Assessment Plan

Student artifacts (assessment mechanism)	Target Student Outcomes/competencies
Homework 6	Outcome 6

Table 2 Spreadsheet for Student Performance on Student Artifacts

Stud. / Artifact / Student ID	Outcome 6 HW6
STU01	100
STU02	100
STU03	100
STU04	100
STU05	80
STU06	100
STU07	90
STU08	100
STU09	100
STU10	100

STU11	100
STU12	80
STU13	100
STU14	100
STU15	90
STU16	80
STU17	100
STU18	100

Table 3 Summary of Findings

Objective Letter	
Artifact / Rubric score	Outcome 6
	Artifact/question
Total Exceeds	18
Total Meets	0
Total Below	0
Total Students	18
Exceeds %	100.00
Meets %	0.00
Below %	0.00
Total % of Meets and Exceeds for the competency	100.00
Overall % of Meets and Exceeds for Outcome 6	100.00

F. CPSC 5590 (Outcomes (1,2, 4, 5)

Computer Science and Engineering Course Assessment Sheet:
Course Number – CPSC 5590 Advanced Computer Networks

Outcome 2: Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.

Course Number and Name of the Course: CPSC 5590 Advanced Computer Networks

Catalog description of the course: The theory, design, engineering, and installation of networks to connect digital computers. The course will prepare students to plan and implement a network. Also includes peer-to-peer networks, the client-server model, network operating systems, and an introduction to wide-area networks. The network and implementation tools may vary to meet current development trends.

6) **Competencies to measure Outcome 2:** Ability to develop and implement a computing-based software solution corresponding to requirement specification (5100, 5210, 5800, 5590)

Target: Meets or exceed expectations is equal to or greater than 80%.

Implementation Plan Fall 2021
Key/Responsible Personnel: Farah Kandah

Competencies:
Ability to identify various testing techniques and strategies and develop test cases for black box testing, white-box testing, and boundary testing (5100, 5800, 5590)

Student Artifact Used: Assignment 1: Q2
Students were given a network diagram and were asked to measure the transmission delays/round trip time with DNS caching between clients and servers.

Meets or Above Expectations:	89.47 % (percentage for this question only)
Above Expectations:	89.47 % (percentage for this question only)
Meets Expectations:	0.00 % (percentage for this question only)
Below Expectations:	10.53 % (percentage for this question only)

Results: Target Achievement: Achieved
Recommendations: *No recommendations are needed*

Detailed Assessment of
Course Number and Name

Table 1 Course Assessment Plan

Student artifacts (assessment mechanism)	Target Student Outcomes/competencies
Assignment 1-Q2	Outcome 2

Table 2 Spreadsheet for Student Performance on Student Artifacts

Stud. Artifact Student ID	Outcome 2 Assignment (1) – Q2	*Need a new column for each*
STU01	E	
STU02	E	
STU03	E	
STU04	E	
STU05	E	
STU06	E	
STU07	E	
STU08	E	
STU09	E	
STU10	E	
STU11	E	
STU12	E	
STU13	E	
STU14	E	
STU15	E	
STU16	E	
STU17	E	
STU18	B	
STU19	B	

Table 3 Summary of Findings

Objective Letter		
Artifact Rubric score	2	*Repeat for each above*
	Assignment (1) – Q2	*Repeat for each above*
Total Exceeds	17	
Total Meets	0	
Total Below	2	
Total Students	19	
Exceeds %	89.47 %	
Meets %	0.00 %	
Below %	10.53 %	
Total % of Meets and Exceeds for the competency	89.47 %	
Overall % of Meets and Exceeds for Outcome B	89.47 %	

G. CPSC 5210 (Outcome 5)

Computer and Engineering Course Assessment Sheet:
CPSC 5210 – Design and Analysis of Computer Algorithm

Outcome 5: Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.

Course Number and Name of the Course:

CPSC 5210 – Design and Analysis of Computer Algorithm

Catalog description of the course:

Measurement of the computational and storage complexity of algorithm. Algorithm design techniques including divide and conquer, parallel programming, greedy method, dynamic programming, search and traversal, backtracking, branch and bound, graph algorithms, the theory of NP-completeness and NP-complete problems. As the advanced topics, the algorithms about the numerical solution to partial differential equations (PDE) and machine learning (e.g., neural network, Bayesian network) will be covered as well.

Course Objectives:

The goal of this course is to introduce the techniques used to design and analyze efficient algorithms for solving real-world problems. Since the range of applications of computers is broad, the course will cover a variety of topics, including sorting, searching, dynamic programming, greedy algorithms, graph algorithms, and NP-completeness. At the completion of this course, a student should be able to build the common data structures; be able to analyze the time and space complexity for common algorithms; be familiar with the common sorting and searching algorithms; be comfortable with dynamic programming, greedy algorithm, graph algorithms, NP-completeness, mathematical and numerical methods in the training of neural network, numerical solution to PDE (e.g., finite element method, finite difference method, numerical linear algebra), and machine learning (e.g., deep neural network). The student should learn to solve practical and complex problems where the choice of appropriate algorithms is essential to implement effective programs with acceptable time and space requirements.

5) **Competencies to measure Outcome 5**: Demonstrate the team ability to develop documentation for requirement specification, design specification, source code documentation, and testing documents for a system. (5215, 5260)

Target: Meets or exceed expectations is equal to or greater than 80%.

Implementation Plan (timeline): Fall 2019
Key/Responsible Personnel: Yu Liang

Competencies: read a recursive function and use recursive time complexity to describe its time complexity.

Student Artifact Used: 20
Final Project

Write a research/survey paper about the application of algorithm analysis in students' domain study:

- Each group submits one copy of the paper (>=7 pages, IEEE double-column format, excluding citations)
- Besides the report, a contribution sheet needs to be submitted by the team leader
- Latex-generated PDF is recommended

Summary of Findings for the outcome:

Meets or Above Expectations:	100.00%
Above Expectations:	80.00%
Meets Expectations:	20.00%
Below Expectations:	0.00%

Results: Target Achievement: met.
Recommendations: some students had not determined their topics until the last minutes. An early reminder will be posted on Canvas to future students.

Detailed Assessment of
CPSC5210: Design and Analysis of Computer Algorithm

Table 1 Course Assessment Plan

Student artifacts (assessment mechanism)	Target Student Outcomes/competencies
Final Exam	Graduate Students from the College of Engineering, UTC

Table 2 Spreadsheet for Student Performance on Student Artifacts

Stud. Artifact Student ID	Outcome 5 - Communicate effectively Final exam, Question 2
STU01	E
STU02	E
STU03	E
STU04	E
STU05	E
STU06	E
STU07	E
STU08	E
STU09	M
STU10	E
STU11	M
STU12	M
STU13	E
STU14	E
STU15	E
STU16	M
STU17	E
STU18	E
STU19	E
STU20	E

Table 3 Summary of Findings

Objective Letter	
Artifact / Rubric score	Outcome 5: Communicate effectively
	Artifact/question
Total Exceeds	16
Total Meets	4
Total Below	0
Total Students	20
Exceeds %	80.00
Meets %	20.00
Below %	00.00
Total % of Meets and Exceeds for the competency	100.00
Overall % of Meets and Exceeds for Outcome C	100.00

Appendix D. Library Information

University Library Facts:

- 184,725 square feet

- 5 floors

- Opened January 2015

Details:

The LEED-certified library building is chock full of strategic campus partnerships and is the premier location for student academic needs outside the classroom. New and expanded partnerships represented in the new building include: Art Department, Center for Advisement and Student Success, Copy Services, Information Technology Division, Disability Resources Center, Southern Writers, Walker Center for Teaching and Learning, and Writing and Communication Center. Designed with a robust technological infrastructure and themes of transparency, collaboration, and flexibility, student access and success was at the center of building planning processes.

- 37 study rooms (29 small, 7 medium, 1 large)

- 2 practice presentation rooms

- 24 hour student study space, opened Sunday to Thursday

- 4 lounges (2 quiet, computer and graduate student)

- Starbucks

- Information Commons (research assistance and 175+ computers)

- Studio 305: advanced media studio and creator space

- Seating for over 2,100

- 7 classrooms

- 8 seminar and conference rooms

- 29 faculty and graduate student carrels

- 2 visiting scholar rooms

- Grand reading room

- Moveable compact stacks with storage for ~600,000 volumes

- New material browsing area (think more Barnes and Noble)

- Media viewing room

- Expanded special collections storage with unique climate controls

- Auditorium housing 2 lecture halls of ~225 seats each adjacent to the library.

Appendix E. Computer Science-Related Journals

The majority of journals are available online and can be accessed through the UTC Library Journals Search feature. Full-text journals (online and print) in the UTC Library that include computer science and engineering-related content are presented below.

Computer Full Text Journals

ACM computing surveys
ACM journal of computer documentation
ACM journal on emerging technologies in computing systems
ACM queue
ACM transactions on accessible computing
ACM transactions on algorithms
ACM transactions on applied perception
ACM transactions on architecture and code optimization
ACM transactions on Asian language information processing
ACM transactions on autonomous and adaptive systems
ACM transactions on computation theory
ACM transactions on computational logic
ACM transactions on computer systems
ACM transactions on computer-human interactions
ACM transactions on computing education
ACM transactions on database systems
ACM transactions on design automation of electronic systems
ACM transactions on embedded coding systems
ACM transactions on graphics
ACM transactions on information and system security
ACM transactions on information systems
ACM transactions on internet technology
ACM transactions on knowledge discovery from data
ACM transactions on mathematical software
ACM transactions on modeling & computer simulation
ACM transactions on multimedia computing, communications, and applications
ACM transactions on programming languages and systems
ACM transactions on reconfigurable technology and systems
ACM transactions on sensor methods
ACM transactions on software engineering and methodology

ACM transactions on speech and language
ACM transactions on storage
Aircraft Engineering and Aerospace Technology: An International Journal
Annual reviews in control
Anti-corrosion methods and materials
Assembly Automation
Biometrics
Biotechnology progress
Canadian journal of chemical engineering
Circuit World
Civil engineering
Communications of the ACM
Comparative technology transfer and society
COMPEL: International J for Computation and Mathematics in Electrical and Electronic Engineering
Computational Intelligence
Computer
Computer-Aided Civil and Infrastructure Engineering
Computers & chemical engineering
Computing in science & engineering
Education + Training
Energy engineering
Engineering Computations: International Journal for Computer-Aided Engineering
Experimental techniques
Expert Systems
Facilities
Fatigue & Fracture of Engineering Materials & Structures
Human factors
IEEE aerospace & electronic systems
IEEE annals of the history of computing
IEEE antennas & propagation letters
IEEE antennas & propagation magazine
IEEE circuits & devices magazine
IEEE communications letters
IEEE communications magazine
IEEE computational intelligence magazine
IEEE computer applications in power
IEEE computer graphics & applications
IEEE concurrency
IEEE control systems magazine
IEEE design & test of computers
IEEE electrical insulation magazines

IEEE electron device letters
IEEE embedded systems letters
IEEE engineering management review
IEEE industry applications magazine
IEEE intelligent systems
IEEE intelligent transportation systems magazine
IEEE internet computing
IEEE journal of oceanic engineering
IEEE journal of photovoltaics
IEEE journal of quantum electronics
IEEE journal of selected topics in applied earth observations and remote sensing
IEEE journal of selected topics in quantum electronics
IEEE journal of solid-state circuits
IEEE journal on emerging and selected topics in circuits and systems
IEEE journal on selected areas in communication
IEEE magnetics letters
IEEE micro
IEEE microwave & wireless components letters
IEEE microwave magazine
IEEE multimedia
IEEE nanotechnology magazine
IEEE network
IEEE photonics journal
IEEE photonics technology letters
IEEE power and energy magazine
IEEE power electronics letters
IEEE power engineering review
IEEE pulse
IEEE reviews in biomedical engineering
IEEE robotics & automation magazine
IEEE sensors journal
IEEE signal processing letters
IEEE signal processing magazine
IEEE software
IEEE solid state circuits magazine
IEEE technology & society magazine
IEEE transactions on aerospace & electronic systems magazine
IEEE transactions on affective computing
IEEE transactions on antennas & propagation magazine
IEEE transactions on applied superconductivity
IEEE transactions on audio speech and language processing

IEEE transactions on automatic control
IEEE transactions on autonomous mental development
IEEE transactions on biomedical engineering
IEEE transactions on broadcasting
IEEE transactions on circuits & systems for video technology
IEEE transactions on circuits & systems: part I
IEEE transactions on circuits & systems: part II
IEEE transactions on communications
IEEE transactions on computational intelligence and AI in games
IEEE transactions on computer-aided design of integrated circuits and systems
IEEE transactions on computers
IEEE transactions on consumer electronics
IEEE transactions on control systems technology
IEEE transactions on device and material reliability
IEEE transactions on dielectrics & electrical insulation
IEEE transactions on education
IEEE transactions on electromagnetic compatibility
IEEE transactions on electron devices
IEEE transactions on energy conversion
IEEE transactions on engineering management
IEEE transactions on evolutionary computation
IEEE transactions on fuzzy systems
IEEE transactions on geoscience & remote sensing
IEEE transactions on haptics
IEEE transactions on image processing
IEEE transactions on industrial electronics
IEEE transactions on industrial informatics
IEEE transactions on industry applications
IEEE transactions on information forensics and security
IEEE transactions on information technology in biomedicine
IEEE transactions on information theory
IEEE transactions on instrumentation & measurement
IEEE transactions on intelligent transportation systems
IEEE transactions on knowledge & data engineering
IEEE transactions on learning technologies
IEEE transactions on magnetics
IEEE transactions on medical imaging
IEEE transactions on microwave theory & techniques
IEEE transactions on multimedia
IEEE transactions on nanobioscience
IEEE transactions on nanotechnology

IEEE transactions on network and service management
IEEE transactions on neural networks
IEEE transactions on neural systems and rehabilitation engineering
IEEE transactions on nuclear science
IEEE transactions on parallel & distributed systems
IEEE transactions on pattern analysis & machine intelligence
IEEE transactions on plasma science
IEEE transactions on power delivery
IEEE transactions on power electronics
IEEE transactions on power systems
IEEE transactions on professional communication
IEEE transactions on reliability
IEEE transactions on robotics & automation
IEEE transactions on semiconductor manufacturing
IEEE transactions on signal processing
IEEE transactions on smart grid
IEEE transactions on software engineering
IEEE transactions on sustainable energy
IEEE transactions on systems, man & cybernetics: part A
IEEE transactions on systems, man & cybernetics: part B
IEEE transactions on systems, man & cybernetics: part C
IEEE transactions on terahertz science and technology
IEEE transactions on ultrasonics, ferroelectrics & frequency control
IEEE transactions on vehicular technology
IEEE transactions on very large scale integration systems
IEEE transactions on visualization & computer graphics
IEEE transactions on wireless communications
IEEE wireless communication
IEEE/ACM transactions on computational biology and bioinformatics
IEEE/ACM transactions on networking
IEEE/ASME transactions on mechatronics
IEEE/OSA journal of display technology
IEEE/OSA Journal of lightwave technology
IEEE/OSA journal of optical communications and networking
Industrial Lubrication and Tribology
Industrial Relations Journal
Industrial Robot: An International Journal
Information Management & Computer Security
Information Systems Journal
Information systems management
Information Technology & People

Instrumentation and measurement magazine
International Journal of Applied Ceramic Technology
International Journal of Clothing Science and Technology
International journal of intelligent computing and cybernetics
International journal of machine tools and manufacture
International Journal of Numerical Methods for Heat & Fluid Flow
International Journal of Operations & Production Management
International journal of production research
International Journal of Quality & Reliability Management
International Transactions in Operational Research
Internet Research: Electronic Networking Applications and Policy
IT professional magazine
Journal of data and information quality
Journal of experimental algorithms
Journal of manufacturing technology management
Journal of microelectromechanical systems
Journal of Petroleum Geology
Journal of Quality in Maintenance Engineering
Journal of the association for computing machinery
Journal of Time Series Analysis
Journal on computing and cultural heritage
Journal on educational resources in computing
Microelectronics International
Multiscale modeling and simulation
Operations research/Management science (with Quality Control)
Photogrammetric Record
Pigment & Resin Technology
Proceedings of the IEEE
Rapid Prototyping Journal
Risk Analysis
Simulation
Soldering & Surface Mount Technology
Strain
Structural Survey
Technology and culture
Transactions on computational biology and bioinformatics
Wireless Communications and Mobile Computing
Wireless Communications IEEE, Transactions on
Wireless Networks
Wireless Personal Communications
Wood Material Science and Engineering

Wood Science and Technology
World Tunnelling and Subsurface Excavation

More Computer Science library materials can be accessed via
https://wikilib.utc.edu/index.php/File:FY23_Computer_Science_Electronic_Journals.pdf

Appendix F: Example Curriculum Vitae

1. Mina Sartipi

2. Education

Degree	Discipline	Institution	Year
B.S.	Electrical Engineering	Sharif University of Technology	2001
M.S.	Electrical and Computer Engineering	Georgia Institute of Technology	2003
Ph.D.	Electrical and Computer Engineering	Georgia Institute of Technology	2006
Institution	Rank	Dates Held	FT/PT
Center for Urban Informatics and Progress	Director	2018-present	FT
University of Tennessee Chattanooga	Guerry Professor	2020-present	FT
University of Tennessee Chattanooga	Professor	2015-2020	FT
University of Tennessee Chattanooga	Associate Professor	2010 - 2015	FT
University of Tennessee Chattanooga	Assistant Professor	2006 - 20010	FT

3. Academic experience

4. Non-academic experience: N/A

5. Certifications or professional registrations: N/A

6. Membership in professional organization
- IEEE (Senior Member)

7. Honors and awards
- Guerry Professor, 2020, Distinguished service to education, research and scholarship
- G20 Smart Cities Alliance, Chattanooga, TN was chosen as one of the two US cities to implement G20's Smart City Alliance policy roadmap
- Named 2019 Chattanooga Influencer- Chosen by the Edge, Chattanooga's Business Magazine, as the 2019 Chattanooga Influencer for her role in Smart City research and collaboration with city, county, and industry partners
- 2020 Smart 50 Awards, Digital Transformation, at the Smart Cities Connect Conference (MLK Smart Corridor)
- 2020 International Data Corporation (IDC) Smart Cities North America Award Winner – Police and Law Enforcement Category

- 2019 IDC Smart Cities North America Award in the education category (with Chattanooga Smart Collaborative Community)
- 2019 Smart 50 Awards, Horizon Award, at the Smart Cities Connect Conference (with Chattanooga Smart Collaborative Community)
- Received the best presenter award in the Faculty Elevator Speech competition Research Day, 2018
- Received the CO.LAB Entrepreneurship Award, 2018
- Elevated to IEEE Senior membership, 2016
- Received the University of Tennessee Chattanooga (UTC) Outstanding Faculty Research and Creative Achievement award, 2016
- Received Faculty Evaluation and Development by Objectives (EDO) Exceeds Expectations Performance Award, 2010, 2011, 2013-2018
- Outstanding Researcher in the Department of Computer Science and Engineering, 2010, 13& 15
- Outstanding Researcher in the College of Engineering and Computer Science, 2010, 14-15
- UC Foundation, 2008

8. Service activities
- Member of the board of directors at EPB, the Enterprise Center in Chattanooga, TN, Thrive Regional Partnership, Mohuman, Variable, Inc.
- Keynote speaker: National Transportation Training Directors – October 2018
- Invited talks and keynotes: Smart Cities Connect Conference – 2019, Transportation Research Board (TRB) –2019. Sprint IoT – 2019, Council on Competitiveness Forum – 2018, TennSmart – 2018, National Transportation Training Directors – 2018
- Faculty advisor for the GiCS (Girls in Computer Science)
- PhD Coordinator for the Computational Science: Computer Science
- Serve on the College Outreach and Research Committee, CSE RTR committee, UT-System IT Policy Advisory Group, task force for the Faculty/Staff Hardware Refresh

9. Publications and presentation from past five years (sample)
- M. K. M. Fadul, D. R. Reising and M. Sartipi, "Identification of OFDM-Based Radios Under Rayleigh Fading Using RF-DNA and Deep Learning," in IEEE Access, vol. 9, pp. 17100-17113, 2021.
- J. Roland, P. D. Way, C. Firat, T. -N. Doan, M. Sartipi, "Modeling and predicting vehicle accident occurrence in Chattanooga, Tennessee," Elsevier Journal of Accident Analysis & Prevention, Volume 149, 2021, 105860, ISSN 0001-4575.
- Peter D. Way, Jeremiah Roland, Osama Osman, Mina Sartipi, "Spatio-Temporal Accident Prediction: Effects of Negative Sampling on Understanding Network-Level Accident Occurrence," Transportation Research Record, 2021.
- Y. Patel, C. Firat, T. Childers and M. Sartipi, "Ridership Prediction Of New Bus Routes At Stop Level By Modeling Socio-economic Data Using Supervised Machine Learning Methods", Transportation Research Board, Jan. 2021.
- A. Alharin, T. -N. Doan and M. Sartipi, "Reinforcement Learning Interpretation Methods: A Survey," in IEEE Access, vol. 8, pp. 171058-171077, September 2020.

10.   Recent professional development activities
    Organize workshops and information session
    Work very closely with community and city of Chattanooga
    Serve on panels (*e.g.,* NSF, MetroLab Networks, US Ignite)
    Serving on several internal and external committees.
    Serving as TPC of several conferences.
  Advising postdoc, undergraduate and graduate students

Curriculum Vitae[1]

ANTHONY SKJELLUM, PhD

skjellum@gmail.com, cell: +1-205-807-4968

Expertise

High Performance Computing, Systems Software, and Scalable Simulation
Systems Engineering and Cyber Security, Blockchain Technology, Scientific Computing

Development, Advancement, Leadership, and Management of Academic Units and Entrepreneurial Enterprises

Education

PhD: Chemical Engineering, Minor in Computer Science, California Institute of Technology, June 1990

Dissertation: *Concurrent Dynamic Simulation: Multicomputer Algorithms Research Applied to Ordinary Differential-Algebraic Process Systems in Chemical Engineering*

M.S.: Chemical Engineering, California Institute of Technology, June 1985

B.S.: Physics (Honors), California Institute of Technology, June 1984

Employment

University of Tennessee, Chattanooga   August 2017–present
Professor of Computer Science (Tenured) and Chair of Excellence,
Director, SimCenter – Center of Excellence in Applied Computational Science and Engineering
(A Tennessee Higher Education Commission-funded Center)

Auburn University, Department of Computer Science and Software Engineering   -
    Professor of Computer Science and Software Engineering (Tenured), June 2014 – August 2017.

- McCrary Eminent Scholar Endowed Chair, August 2016 – August 2017.
- Director of the Charles D. McCrary Institute for Critical Infrastructure Protection and Cyber Systems, August 2016 – August 2017.
- COLSA Corporation Cyber Security and Information Assurance Endowed

Professorship,
    July 2014 – August 2016.

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[1] December 17, 2022 update

- Auburn Lead Scientist for Cyber Research, July 2014 – August 2017.
- Director of the Auburn Cyber Research Center, July 2014 – August 2017.

University of Alabama at Birmingham (UAB), Department of Computer and Information Sciences (now renamed to: Department of Computer Science)
- Professor and Chair, August 2003 – June 2014
- Director of UAB University-wide Research Center – CIA|JFR, 2011 – June 2014

Mississippi State University, Dept. of Computer Science, January 1993 – July 2003
- Director, NSF ERC High Performance Computing Laboratory, January 1997-

  July 2003
- Tenured Associate Professor, 1997
- Associate Professor, 1996
- Assistant Professor (Tenure earning), 1993

Lawrence Livermore National Laboratory, 1990-1993
- Computer Scientist (Q-cleared fulltime employee)

Entrepreneurial efforts have included these additional outside activities:
- President, MPI Software Technology, Inc, 1996-2002 (Spin-off from Mississippi State University)
- Chief Technology Officer, MPI Software Technology, Inc, 2002-2004
- Chief Software Architect, Verari Systems Software (Formerly MPI Software Tech.), 2004-2009. Verari closed its doors in 2009 during the "Great Recession."
- Co-Founder, CTO of RunTime Computing Solutions, LLC, 2009-present. RunTime Computing acquired key software assets from Verari in 2009; it is a successful Chattanooga, TN embedded software, consulting, and services company with US and international customers, primarily in aerospace and government.

Professional Activities
External Advisory Board Member, Computer Science, Dept., Tennessee Technological University, 2022-present.
Editorial Board, *Parallel Computing*, March 1992-December 1995
Editorial Board, *The International Journal of Supercomputer Applications and High Performance Computing*, November 1993-2000
Editorial Board, *Concurrency & Communication: Practice & Experience*, 1994-present Working Group Chair, "Persistence," MPI-4 Standard, MPI Forum, 2013-present.

Working Group Co-chair, "Collective," MPI-4 Standard, MPI Forum, 2017-present. Sub-committee Chair, Message Processing Interface (MP-3I) Standards Committee, 2010-2013 (Persistent Communications Working Group),
Co-Chair, Real-Time Message Passing Interface (MPI/RT) Forum, 1997-2005.
Sub-committee Chair, BLAS Technical Forum (Lite BLAS/ BLAIS), 1995-98
Sub-committee Chair, Message Processing Interface (MPI) Standards Committee II,
1995-96 (Collective Chapter), 1995-97 (Real-Time), Persistence (2012-2019), Collective (2017-2019)
Sub-committee Chair, Message Processing Interface (MPI) Standards Committee, 199394
Newsletter Co-Editor (with Andrew Lumsdaine), Society of Industrial and Applied Mathematics (SIAM) Supercomputing Activity Group
Chair, MPIDC '99, Atlanta, GA, March 9-12, 1999
Organizing Committee of MPIDC '95 and MPIDC '96, Notre Dame, IN
Chair, 1997 Gordon Conference on HPC/II, Plymouth, NH, July 1997
Co-Chair, (Daniel Reed, Chair) 1995 Gordon Conference on HPC/II, Plymouth, NH, July 1995
Co-Chair, (Jack Dongarra, Chair; Co-Chair: David Walker), 1992 Gordon Conference on HPC/II (Previous name Software Tools and Libraries for HPC), Plymouth, NH, July 1992
Program Director, SIAM Supercomputing Activity Group, January 1994-December 1996
Editor, *Proceedings of MPIDC '99*, March 1999
Editor, *Proceedings of the Scalable Libraries Conference*, October 1994
Editor, *Proceedings of the Scalable Libraries Conference*, October 1993
Invited participant, Second Pasadena Workshop on System Software and Tools for High-performance Computing Environments (Pasadena II), January 1995

Awards and Honors
ACM Senior Member, 2014
IEEE Senior Member, 2013
Mississippi Business Journal, "Top 40 Under 40 Award," January 21, 2002
2001 Tibbetts Award Winner (MPI Software Technology, Inc) – excellence in SBIR commercialization (National Award – State of Mississippi Winner)
College of Engineering Hearin Eminent Scholar, 2001-03
1999 College of Engineering Outstanding Engineering Research Award
MSU Alumni Association Research Award, May 1998
College of Engineering Hearin-Hess Distinguished Professor, 1996-97 and 1997-98
MSU ACM Student Chapter Computer Scientist of the Year Award, May 1994
Best Student Paper in Operating Systems Area (First Prize) "Zipcode: A Portable Multicomputer Communications Library atop the Reactive Kernel," Fifth Distributed Memory Computing Conference, Charleston, South Carolina, April 1990
Runner-Up Student Paper in Applications Area, A: LU Factorization of Sparse, Unsymmetric Jacobian Matrices on Multicomputers, Fifth Distributed Memory Computing Conference, Charleston, SC, April 1990.
IBM Tau Beta Pi Award (California Institute of Technology), writing competition, 1981

Selected Administrative Achievements as UAB Chair of Computer and Information Sciences

1) Led successful ABET Accreditation for the Bachelor of Science Program (October 2005). Re-visit October 2012 (renewed as of September 2013).
2) Recruited, hired, and retained at total of seven professors during past ten years. Total faculty size was thirteen FTEs as of June 30, 2014, including one professor who started in August 2013.
3) Recruited two women assistant professors (among those seven mentioned), one is already tenured, the second is Hispanic. The tenured professor was promoted to full professor at UAB as of May, 2015.
4) Two of my assistant professor hires (T. Solorio, R. Hasan were awarded NSF EARLY CAREER funding (notified in December 2013, effective 2014). I later nominated one of these professors (T. Solorio) for the Denise Denton Award, which she won and received recognition in 2014.
5) Graduated a PhD student who is an African American Woman in 2010 (Dr. Vetria Byrd). She is currently working as an assistant professor on tenure track at Purdue University.
6) Recruited and hired Mr. Gary Warner, internationally renowned cybercrime expert in 2006. He is now the Director of the CIA|JFR that I inaugurated at UAB (see below).
7) Remodeled research labs and infrastructure, including winning three MRI grants (serving as PI) to enable CIS and HPC research.
8) Oversaw the regrowth in undergraduate population, and growth in PhD student graduations in the past nine years.
9) Obtained approval for the Master of Science in Computer Forensics and Security Management, program. Commenced operation in Fall 2011.
10) Introduced several types of continuous improvement processes for undergraduate and graduate education
11) Introduced supplemental instruction in CIS (tutoring for key undergraduate courses).
12) Designed and Introduced the Senior Capstone course (both for ABET and QEP requirements).
13) Introduced requirement for public speaking class for all computer science majors; Introduced public speaking requirements into the senior-level software engineering class as well as senior capstone.
14) Added ethics components to the software engineering and senior capstone classes.
15) I currently serve as founding chair of the "Research Capacity Building Committee," a faculty-led effort I proposed in 2009 for expanding research opportunities and improving efficiency (from a faculty viewpoint) of all aspects of funded R&D. Supported directly by UAB VP of Research.
16) Grew research space for CIS and other faculty significantly with a new laboratory space in February 2010. This was based on a $500,000 investment from our administration and Deans.

17) Approval of the Bachelor Science in Bioinformatics Degree at the University level. This has also been approved at the state level at the pre-proposal stage (NISP). We started developing the full proposal as of February 2014.

Selected Administrative Achievements as UAB Director of CIA|JFR UWIRC

1) Won approval for an Interdisciplinary Center for Forensics at UAB – CIA|JFR. Was only one of three non-medical UWIRCs at UAB as of June 30, 2014.
2) Successfully developed the Center for Information Assurance and Joint Forensics Research (CIA|JFR) from its 2011 approval to full center status with 45 members across UAB and a high level of activity.
3) With Development, obtained $250,000 gift in 2012 from Facebook for the CIA|JFR completion and leveraged that into a $900,000 upgrade on the 4th Floor of UBOB with a state-of-the-art facility. This was completed February 2013, providing our UWIRC center with a permanent home. It currently houses additional faculty from CIS, Justice Sciences, and one faculty member from Anthropology, as well as upwards of 60 student/postdoc researchers at peak usage.
4) In 2012, recruited Dr. John Grimes from his previous role in Justice Sciences to the Center into a new position, a research professor working almost exclusively on the Center mission and business development as well as his area of pedagogy.
5) Developed and chaired a successful conference series – Cyber Summit, first held at UAB in 2012 and at the BJCC (conference center) in 2013, and again at UAB in February 2014.
6) Launched the UAB Big Data Conference Series, the first of which was held in May 2013, co-sponsored by Intel, Data Direct Networks, and Cray Computer. This conference, which was co-sponsored with CIS, brought big-data science visibility to UAB for the first time and include life sciences, business, and forensics areas.
7) Supported the successful spin-off of the first commercial entity from the CIA|JFR, *Malcovery*, in 2012. Housed in *Innovation Depot*, it its hired first CIS graduate as an early employee. Some years later, this company was acquired/merged.
8) In 2013 and 2014, served as Co-PI and co-lead on developing the proposal with two professors at UAH and USA on a $20M NSF EPSCOR Track-1 Proposal unifying over 40 Cyber-related scientists in the state. NSF EPSCOR Track-1 first had to win approval from the state committee. EPSCOR Track-1 is applicable in states with historically lower federal funding (26 of 50 states qualify). In 2014, we resubmitted. (This effort was completed while Center Director at Auburn.)
9) In 2013, joined with Auburn University leaders, UAB colleagues and other colleagues from around the state to create the Alabama Cyber Research Consortium (ALCRC.ORG), which is now an effective, statewide collaborative forum for building capacity in cyber R&D.

Selected Administrative Achievements as Auburn Cyber Center Director (July 1, 2014August 2017):

1) Established a new research laboratory in "Internet of Things" and "Industrial Control Systems"
2) Recruited and supported a new group of 11 students (including 2 minority students and 1 female student) in cyber. Additionally, we had 7 undergraduate students involved as of Fall 2015.
3) Obtained significant new DOD-related cyber funding in Huntsville, AL (a major hub of DOD R&D) during my first year on faculty at Auburn for work on Cyber R&D ($91K as PI, $273K as co-PI); the majority of this funding continues in FY16.
4) Worked with Auburn development on closing a $250,000 (+$250,000 deferred) donation for the "Lt General Ronald Burgess, Jr, USA, Retired Cyber Research Laboratory," which is the new home of the Cyber Center. Occupancy was in November 2016.
5) Created a visible, viable Cyber Center, with internal University and growing external visibility.
6) Led efforts to ramp up funded R&D with over 10 proposals submitted in the first year in which I was either the PI or a co-PI. 17 awarded grants/contracts since starting at Auburn on July 1, 2014 with approximately $3M of total funding (either as PI or co-PI).
7) Promoted to Inaugural Director of the *Charles D. McCrary Institute for Critical Infrastructure Protection and Cyber Systems* (starting 8/16/16). Currently building a new, campus-wide institute with endowed funding in CIP and Cyber security, systems engineering. Responsible for managing an annual base budget of approximately
$350,000 and deploying annual income from the $10M endowment for the Institute.

Selected Administrative Achievements as SimCenter Director (August 2017-present):
1) Led upgrade of the high-performance computing and storage systems and established SimCenter as UTC's "Research Computing Core Facility"
2) Organized and supported a new, research network capacity to support smart cities, IoT, and related R&D
3) Began "rebranding" of SimCenter as a holistic part of the UTC's research and experiential learning cores
4) Engaged over a dozen new faculty in SimCenter from multiple colleges across UTC
5) Held two retreats (December 2017, January 2019) for team building and establishing trust and new collaborations.
6) Hired new positions: Grants Administrator and Graphic Artist/Web designer – to support SimCenter's support and outreach to campus faculty.
7) Dismissed probationary employee and rehired a superior Budget Coordinator (2018)
8) Converted temporary system administrator to fulltime position to provide long-term continuity and better support to students and professors working on high performance computing.

9) Upgraded and enhanced the research pilot award programs (CEACSE/THEC awards)— improved processes, improved peer review, and broader engagement of faculty across the UTC campus
10) Established strong working relationships with key Deans, chairs, and stakeholders to enhance faculty and student involvement in SimCenter programs and facilities
11) Began process of enhanced community engagement of SimCenter with Chattanooga.
12) Began process to engage regularly with Oak Ridge National Laboratory (ORNL)
13) Began the process of establishing meaningful international collaborations with University of Edinburgh and University of Cadiz.
14) Supported the submission of over 70 proposals in Fiscal Year 2018.
15) Obtained $64,000 of NSF grant supplements to support undergraduate research in 2018.
16) PI on $250,000 ReVV Economic Development funding to Support IMSA (A Chattanooga Startup)
17) PI at UTC for joint Boston University-UTC NSF Funding ($450K is UTC portion) in 2019.
18) PI of NSF CC*Compute Grant (approx. $393K)—New Cluster Computing Facility (2019).
19) Co-PI on NSF CC*Network Grant (approximately $500K)---New 100Gbit/s Research Network for Campus. 2019. [Later PI on this grant.]
20) PI on UTC/TTU EHR: PEER proposal for total of $100K for workshops on workforce development in Digital Twins.
21) Took lead role in development and submission of a large-scale, Department of Energy / NNSA - High-Performance Center Proposal (continuing in Calendar 2019) with the

University of Alabama at Birmingham, and University of New Mexico (Albuquerque)--PSAAP III "Center for Understandable Performance – Exascale Communication Systems" ---funded. $1.2M to UTC over 5 years.

22) Mentored more than 10 faculty on research capacity building and career strategy in 2018 and 2019.
23) Established new Research Thrusts in Cyber and High-Performance Computing, "Digital Twin, "Critical Infrastructure Protection," and "Extreme Systems" Research Thrusts for SimCenter.

Grants and Contracts

Collaborative Research: EAGER: Real-time Strategies and Synchronized Time Distribution Mechanisms for Enhanced Exascale Performance-Portability and Predictability; PI: Anthony Skjellum: 6/2022-5/2023; $90,453.

Sandia National Laboratories Contracts ($100K total, thus far) – Work on Software Engineering for HPC Systems Software Stacks, 2020-2023.

"CC* Compute: Augmenting a 2,560-core EPYC2 Computational Cluster with GPUs for AI, Machine Learning, and other GPU-Accelerated HPC Applications," A. Skjellum (PI), Co-PIs: Eleni Panagiotou, Farah Kandah, Yingfeng Wang, Kidambi Sreenivas; $415,868, 2022-2024,

"CC* CRIA: Planning a Regional Cyber-Infrastructure-Research Consortium for Middle Tennessee," PI: Anthony Skjellum; Co-PIs: Ryan Otter, Gerald Gannod, Farah Kandah, Sheikh Ghafoor; 7/1/2020-6/30/2023; Award Amount: $249,713.00;

DOE/NNSA PSAAP III Center for Understandable Performance – Exascale Communication Systems - subcontract from the University New Mexico (lead); other collaborating institution, University of Alabama; UTC Portion: $1.2M over five years (UNM PI: Patrick Bridges, UA co-PI: Purushotham V. Bangalore)

LLNL/LLNS - MPI R&D for Fault Tolerance – $60K. Skjellum, PI, 2020.

LLNL/LLNS - MPI R&D for Fault Tolerance – $60K. Skjellum, PI, 2019.

"NSF Collaborative Research: Software Engineering Workforce Development in High Performance Computing for Digital Twins." A. Skjellum (PI) with two UTC co-PIs and two TTU co-PIs. UTC portion: $57,635.

"NSF HDR DSC: Collaborative Research: Transforming Data Science Education through a Portable and Sustainable Anthropocentric Data Analytics for Community Enrichment Program." Yu Liang (Overall PI), A. Skjellum (co-PI), with three other co-PIs at UTC. $723,644 (UTC portion). 2019

"NSF SPX: Collaborative Research: Intelligent Communication Fabrics to Facilitate Extreme Scale Computing," Boston University PI: Martin Herbordt; UTC PI: A. Skjellum, with C. Tanis (co-PI). $450,097 (UTC portion). 2019.

ReVV Grant (IMSA), A. Skjellum (PI), with two UTC co-PIs. $250,000. May 5, 2019 November 5, 2020.

"NSF CC* Compute: A Cost-Effective, 2,048 Core InfiniBand Cluster at UTC for Campus Research and Education," Skjellum (PI), with 4 co-PIs at UTC. $392,235. 2019.

"NSF CC* Networking Infrastructure: Advancing High-speed Networking at UTC for Research and Education," F. Kandah (PI), A. Skjellum (co-PI), with 3 other co-PIs at UTC -$515,663; 2019.

Sandia - MPI R&D– $100K. A. Skjellum, PI, C. Tanis, co-PI. 2019-2020 (split funding over 2 fiscal years).

NSF CICI: Data Provenance: Collaborative Research: Provenance Assurance Using Currency Primitives (Supplement), A. Skjellum, PI, R. Brooks (Clemson), co-PI, $39,000 (UTC Portion), January 1, 2016-December 31, 2019. [Supplement.]; Additional $34,866 supplement to UTC only in 2019.

LLNL/LLNS - MPI R&D for Fault Tolerance – $59K. Skjellum, PI, 2018.

IBM Faculty Award (Philanthropic Grant for R&D in Distributed Grid). A. Skjellum, $20,000 (no indirect). 2018.

IBM Faculty Award (Philanthropic Grant for R&D in Machine Learning for Malware). A. Skjellum, $40,000 (no indirect). 2016.

NSF-ACI-1642083 - CICI - SE Scientific Cybersecurity For University Research – Clemson, UAH, Auburn, Vorhees, JSU. Skjellum PI for Auburn. $80,964 (Auburn budget). 10/1/16-9/30/18. [Transferred to UTC.]

NSF-ACI-1642133-CSSE – CICI - Data Integrity Assurance &Privacy Protection Solutions For Secure Interoperability Of Cloud Resources – Ku (PI), Skjellum (co-PI), $467,028 (UAB has a separate budget in addition to this). 10/1/16 - 9/30/19.

SIT-2102659-01-TO65-RT165 - Cybersecurity For System Of Systems Architectures – Umphress (PI), Skjellum (co-PI), $174,813. 8/9/16-8/8/17.

PROGENY-PSC-0342 –COTS Approach To Information Security – STTR subcontract – Umphress (PI), Skjellum (co-PI), $120,000. exp. 11/9/16-6/27/18.

LLNL/LLNS - MPI R&D for Fault Tolerance – $54,000. Skjellum, PI. 10/1/16- 9/30/17.

NSF SHF: Medium: Collaborative Research: Next-Generation Message Passing for Parallel Programming: Resiliency, Time-to-Solution, Scalability, and QoS. Collaborative with UAB. Auburn Portion proposed $736,557. Funded at $602,000. Total budget of approximately $1M between the institutions. 6/1/16-5/31/20. [Transferred to UTC.]

NSF SHF: Small: Collaborative Research: Coupling computation and communication in FPGA-enhanced Clouds and Clusters. Joint with Boston University. $249,063 (Auburn portion). Funded at $225,000. 9/1/16-8/31/19. [Transferred to UTC.]

NSF CICI: Data Provenance: Collaborative Research: Provenance Assurance Using Currency Primitives, A. Skjellum, PI, R. Brooks (Clemson), co-PI, $248,755 (Auburn portion), January 1, 2016-December 31, 2019. [Transferred to UTC.]
DOD/NSA: Using Data Mining to Detect Malware in the Internet of Things. A. Skjellum, PI, $74,683, August 1, 2015-August 31, 2016.

NSF EAGER Cyber Manufacturing- Novel Process Data Analytics Framework For IotEnabled Cybermanufacturing, J. Wang, PI, A. Skjellum, Co-PI, $244,942, September 1, 2015-August 31, 2018.

Ephemeral Security Overlay For GPS, SBIR, Integrated Solutions For Systems: AfFA9453-15-M-0473, $5,000, July 10, 2015-April 10, 2016 (co-PI with Drs. Alvin Lim and David Bevly).

BAE Subcontract from US Army ("Cyber Risk," "Kestrel Eye"), R. Summers, PI, A. Skjellum, Co-PI, $273,870, September 29, 2014 – September 28, 2015 (with renewals in ~$100K FY16 and FY17).

COLSA Professional Engineering Services (for AMDREC), subcontract to US Army, A. Skjellum PI, $91,507, February 15, 2015 – September 23, 2015. (with no cost extension in 2016).

Sandia Funding for Exascale Storage System Research, A. Skjellum, PI, $161,000, October 1-September 30, 2015. (with renewal year in FY16 at $85,000).

Sandia Funding for Exascale Fault Tolerant MPI, A. Skjellum, PI, $30,000, July 1September 30, 2014.

Sandia Funding for Exascale Storage System Research, A. Skjellum, PI, $64,000, July 1September 30, 2014.

Sandia Funding for Exascale Storage System Research, A. Skjellum, PI, $41,000, March 2014-June 30, 2014.

Sandia Funding for Exascale Fault Tolerant System Research, A. Skjellum, PI, $100,000, March 2013.

"Alabama Innovation Fund," supported by Governor Bentley, A. Skjellum, PI, $250,000 plus UAB match. 2012. This award recognizes and supports CIS and Center commercialization efforts, notably *Malcovery*, plus is partially supporting two postdoctoral fellows at CIS in 2013.

Sandia Funding for Exascale File System Research (Sirocco), A. Skjellum, PI, $250,000, February 2013 (for October 1, 2012 start). Total funding yielded was nearly $1M over time.

"EAGER Grant, Research in Fault Tolerant MPI," A. Skjellum, PI; $100,000. National Science Foundation, 2012, no-cost extended through May 31, 2014.

"MRI: Development of a GPU-Enabled, Petascale Active Storage Architecture for Data Intensive Applications in HPC and Cloud Environments," A. Skjellum PI: $300,000 plus $128,000 UAB Matching, National Science Foundation, 2012. [Switched to co-PI on move to Auburn in 2014.]

Sandia Funding for Exascale File System Research (Sirocco), A. Skjellum, PI, $245,000, December 2011. Renewable for 4 more years – total expected support over $1.2M. Renewals shown above at UAB and then at Auburn starting in 2014.

"NSF EAGER Grant, Research in Peer File System," A. Skjellum, PI; also, joint funding with Clemson University, 2010-2011. UAB funding is $67,000. Led to Sandia follow-on support.

Funding from Sandia National Laboratories for Work on Peer File System Research, 20092010 (on-going). Initial funding level: $80,000. A. Skjellum, PI at UAB. Also funded are Clemson University and University of Minnesota on separate contracts.

"Cybercrime and Security: A Model State Partnership," United States Department of Justice, Bureau of Justice Assistance. ($500K over 1 year). John J. Sloan, III and Anthony Skjellum (Co-Principal Investigators).   Grant #2010-DD-BX-0603, 2010.

"UAB Anti-Cybercrime Computational Operation," Edward J. Byrne Memorial State and Local Justice Assistance Grant ($447K over three years). John J. Sloan III and Anthony Skjellum (Co-Principal Investigators).   Grant #2008-DD-BX-0407, 2008.

 "Support for UAB Computer Forensics Laboratories Project," United States Department of Justice, Office of Community Oriented Policing Service (COPS), COPS Technology Grant. FY 2006 ($987K over 3 years).   John J. Sloan, III and Anthony Skjellum (Co-Principal Investigators). Grant #2006-CKWX-0582, 2006.

"MRI: Development of a GPU-Enabled Integrated Storage Computation Architecture and System," $300,000 plus $128,000 UAB Matching, National Science Foundation, 2008-12.

"MRI: Computer and Information Sciences Grid Node Research Facility," National Science Foundation, August 15, 2004-July 31, 2007. This is a $250,000 equipment grant, with $107,000 of matching to create the CIS Department's "Grid Node" or "Grid Cluster." Role: PI, with six co-PIs.

"Collaborative Research: A Systematic Approach to the Derivation, Representation, Analysis, and Correctness of Dense and Banded Linear Algebra Algorithms for HPC Architectures," National Science Foundation, July 1, 2003-June 30, 2006 [extended to June 30, 2007]. This project seeks to advance the understanding of how to gain more performance, predictability, and correctness from scalable and cache-memory oriented algorithms key to many scientific applications. Role: PI (at UAB), co-PI of the overall proposal.

"ALGORITHMS: Collaborative Research: New Contributions to the Theory and Practice of Programming Linear Algebra Libraries," National Science Foundation. August 1, 2002July 31, 2003, Role: PI at MSU, Co-PI of overall proposal.

"NGS: Computational Vortals for Next-Generation Scalable Computing," National Science Foundation, December 1, 2001 – December 1, 2004, This grant addresses the use of grid computing and portal-based computing in order to advance scientific problem solving environments. Role: Co-Principal Investigator

"Integration of Fuzzy Data Mining with High Performance Scalable Computing: Intrusion Detection, Fault Detection, and Performance Monitoring," BMDO (DEPSCoR), $623,963, April 2001 - March 2004 (Other PIs: Rayford Vaughn and Susan Bridges).

"A QOS-Based Approach to Clustering and Interclustering with a Unified Methodology for Scalability, Security, Performance, Fault-Handling, and Co-Scheduling," National Science Foundation, $220,000, September 1, 2000 – August 31, 2002, (other PI: Rayford Vaughn).

"A Gigabit/s, VIA-Enabled Cluster Architecture for Research in High Performance
Systems Software, Scalable Knowledge Discovery, Visualization, and Parallel Planning
Under Uncertainty" National Science Foundation CISE Instrumentation Program, $214,939, July 1, 1999 - June 30, 2002 (Other PIs: Julia Hodges, Lois Boggess, Susan Bridges, Donna Reese, Raghu Machiraju, and Eric Hansen).

"Distributed Intrusion Detection Using Fuzzy Data Mining Applied to High Performance Cluster Computation," U.S. Department of Army Research Laboratory, $153,983, September 2000- September 2002 (Other PIs: Rayford Vaughn and Susan Bridges).

 "Parallelizing a FORTRAN90 SWAFS Code with MPI," Mississippi Research Consortium, $42,500, October 1, 1998 - February 28, 1999.

"The Scalable Knowledge Discovery Initiative," Hearin Foundation, $49,000, May 16, 1998 - May 15, 1999 (Other PIs: Julia Hodges, Susan Bridges, and Raghu Machiraju).

"Parallelizing a FORTRAN90 SWAFS Code for CRAY T3E with MPI," Lockheed Stennis, $14,000, December 1, 1997 - February 28, 1998 (PI; co-PIs: Ioana Banicescu and Raghu Machiraju).

"Heterogeneous Embedded Real-Time Systems Environment," Integrated Sensors, Inc. [DARPA BAA 9706 subcontract], $400,000, July 1, 1997 - June 30, 2000.

"Parallel Mathematical Libraries Project II," DOE/USIC/LLNL, $80,000, January 1, 1998 - December 31, 1998.

 "MPICH Technology and Optimizations for the Cray T3E," CEWES MSRC focused effort, $20,000, December 1, 1997 - June 30, 1998.

"Support for Scalable CFD and MPI," CEWES MSRC focused effort, $60,000, April 1, 1997 - March 30, 1998 (PI; Co-PI: Puri Bangalore).

"Technical Computing on Intel Platforms and Scalable Interface for Evolving, Mass-Market PC Applications (supplement)," Intel Software Technology Laboratory, Amount: $45,076, December 1, 1996.

"Myrinet 4.1 Memory-Mapped Device Driver Development for Windows NT Systems," Myricom, Inc, $10,000, December 1, 1996 - January 31, 1997.

"Intel Software Grant," Intel, $18,000, October 1996.

"Development of MPI and Myrinet Technologies for a Secure, Heterogeneous Application Runtime Environment for High Performance Computing (SHARE-HPSC)," Sanders (Lockheed-Martin), subcontract of DARPA contract, $208,523, September 1995 - November 1997.

"Revolutionary Advances in Ubiquitous, Realtime, Multicomputers and Runtime Environments," DARPA/US Air Force Rome Laboratory, $1,250,000, October 1996 - June 1999 (joint project with University of Maryland).

"Tactical Advanced Signal Processor Effort (TASP)," U.S. Navy, $125,000, 1999.

"Tactical Advanced Signal Processor Effort (TASP)," U.S. Navy, $95,000, 1997.

"Parallel Mathematical Libraries Project," DOE/USIC/LLNL, $60,000, July 11, 1996 - December 31, 1997.

"Intel Paragon MPI and ATM Research," Intel, $230,000, July 1996.

"ATM-based Heterogeneous MPI for the P6 Paragon Multicomputer and 4-Way P6 Multiprocessor," Intel, $31,000, January 1, 1996 - December 31, 1998.

"Embedded Message Passing Interface (eMPI) for the Advanced Common Processor," Sanders (Lockheed-Martin, Hudson, NH), $33,000, August 1, 1996 - December 20, 1996.

"Dynamic Process Simulation on Computers with Parallel Architectures," National Science Foundation, $11,000, 1995-1996 (no cost extension of original grant).

"The Parallel Mathematical Libraries Project," United States Industry Coalition, Inc. (USIC; collaboration among LLNL (Dept. of Energy), the Russian Federal Nuclear Center, Arzamas-16 (VNIIEF/Sarov), Intel, and MSU), $35,000, September 1995.

"Technical Computing on Intel Platforms; Scalable Interfaces for Evolving, Mass-Market PC Applications," Intel, Inc., $76,000 (approximate), September 1995.
"A Multi-Faceted Study of Scalable Parallelism for Computational Science and Engineering," Skjellum and Lumsdaine (Notre Dame), National Science Foundation, CoPIs, period of performance: September 15, 1995-August 14, 1998, MSU part of budget: $180,000, ND part of budget $180,000 (both over three years). (Funded unsolicited proposal to CISE ASC Directorate).

"Innovative High Performance Distributed Computing Research and Education: Parallel Algorithms, Libraries, Computational Models, and Distributed Services," National Science Foundation **EARLY CAREER** Award, $124,800, September 1, 1995 - August 31, 1998.

"High Performance Research and Technology for Parallel Programming based on Embedded and Real-time Extensions of the Message Passing Interface (MPI) and MsgWay Protocol," DARPA, $1,386,847, September 1, 1995 - June 30, 1998.

"Collaborative Research and Development of MPI and Myrinet Technologies for Embedded High-Performance Computing," Martin-Marietta Laboratories, $57,656, March-December, 1995.

"National High Performance Distributed Computing Consortium," U.S. Army Corps of Engineers Waterways Experiment Station, $75,000, September 1, 1995 - April 30, 1998.

"Parallel Solution, Grid Generation, and Visualization of Turbo-Machinery Grand Challenge Problems," Department of Energy, $254,598, October 1, 1994 - September 30, 1996, in cooperation with Sandia National Laboratories (co-PIs: D. Reese, E. Luke, and D. Barnette).

"The Multicomputer Toolbox," Lawrence Livermore National Laboratory, $670,000, 1991-92. LDRD internal funding.

Publications

Refereed Journal Papers

"Haghi, Pouya; Guo, Anqi; Xiong, Qingqing; Yang, Chen; Geng, Tong; Broaddus, Justin T; Marshall, Ryan; Schafer, Derek; Skjellum, Anthony; Herbordt, Martin C; "Reconfigurable switches for high performance and flexible MPI collectives," Concurrency and Computation: Practice and Experience, 34:6, e6769, 2022.

"Weerasena, Lakmali; Ebiefung, Aniekan; Skjellum, Anthony; ",Design of a heuristic algorithm for the generalized multi-objective set covering problem," Computational Optimization and Applications, pp. 1-35, 2022,Springer US.

"Nansamba, Grace; Altarawneh, Amani; Skjellum, Anthony; "A Fault-Model-Relevant Classification of Consensus Mechanisms for MPI and HPC," International Journal of Parallel Programming, pp. 1-22, 2022, Springer US.

Dosanjh, Matthew GF and Worley, Andrew and Schafer, Derek and Soundararajan, Prema and Ghafoor, Sheikh and Skjellum, Anthony and Bangalore, Purushotham V and Grant, Ryan E, *Implementation and evaluation of MPI 4.0 partitioned communication libraries,* Parallel Computing, Vol. 108, page ID=102827, 2021.

Altarawneh, Amani and Sun, Fei and Brooks, Richard R and Hambolu, Owulakemi and Yu, Lu and Skjellum, Anthony, *Availability analysis of a permissioned blockchain with a lightweight consensus protocol,* Computers & Security, Vol. 202, page ID 102098, 2021

Sultana, Nawrin and Ruefenacht, Martin and Skjellum, Anthony and Bangalore, Purushotham and Laguna, Ignacio and Mohror, Kathryn, Understanding the use of Message Passing Interface in exascale proxy applications, *Concurrency and Computation: Practice and Experience,* Vol. 33., No. 14, pages ID e5901, 2021.

McCullough, JWS and Richardson, RA and Patronis, A and Halver, R and Marshall, R and Ruefenacht, M and Wylie, BJN and Odaker, T and Wiedemann, M and Lloyd, B and others, *Towards blood flow in the virtual human: efficient self-coupling of HemeLB, Interface focus,* Vol. 11, page ID=20190119, 2021.

Worley, Carl and Yu, Lu and Brooks, Richard and Oakley, Jon and Skjellum, Anthony and Altarawneh, Amani and Medury, Sai and Mukhopadhyay, Ujan, *Scrybe: A Second Generation Blockchain Technology with Lightweight Mining for Secure Provenance and Related,* in *Blockchain Cybersecurity, Trust and Privacy*, Vol. 79, pages 51+, 2020.

Reising, Donald and Cancelleri, Joseph and Loveless, T Daniel and Kandah, Farah and Skjellum, Anthony, *Radio identity verification-based IoT security using RF-DNA fingerprints and SVM,* in IEEE Internet of Things Journal, Vol. 8, No. 10, pages 8356-8371, 2020.

Vincent, Nishani Edirisinghe and Skjellum, Anthony and Medury, Sai, *Blockchain architecture: A design that helps CPA firms leverage the technology,* International Journal of Accounting Information Systems, Vol. 38, Page ID 100466, 2020.

Kandah, Farah and Altarawneh, Amani and Huber, Brennan and Skjellum, Anthony and Medury, Sai, *A Human-Understandable, Behavior-based Trust Management Approach for IoT/CPS at Scale,* INTERNATIONAL JOURNAL OF COMPUTERS AND THEIR APPLICATIONS, pp. 172+, 2019.

Cui, Pinchen and Guin, Ujjwal and Skjellum, Anthony and Umphress, David, *Blockchain in IoT: current trends, challenges, and future roadmap,* Journal of Hardware and Systems Security, Vol. 3, No. 4, pages 338-364, 2019.

Nawrin Sultana, Martin Ruefenacht, Anthony Skjellum, Ignacio Laguna, Kathryn Mohror, *Failure recovery for bulk synchronous applications with MPI Stages,* Parallel Computing, Vol. 84, pp 1—14, 2019.

Daniel J. Holmes, Bradley Morgan, Anthony Skjellum and Purushotham V. Bangalore and Srinivas Sridharan: *Planning for performance: Enhancing achievable performance for MPI through persistent collective operations*, Parallel Computing, Volume 81, pp 32-57, 2019.

Mark Yampolskiy, Wayne E. King, Jacob Gatlin, Sofia Belikovetsky, Adam Brown, Anthony Skjellum and Yuval Elovici: *Security of Additive Manufacturing: Attack Taxonomy and Survey,* Additive Manufacturing, https://doi.org/10.1016/j.addma.2018.03.015, 2018.

Wang, Shuangbao Paul and Ali, Amjad and Guin, Ujjwal and Skjellum, Anthony, *IoTCP: A Novel Trusted Computing,* in Journal of The Colloquium for Information Systems Security Education, Vol 6., No. 1., pages 16+, 2018.

Mark Yampolskiy, Anthony Skjellum, Michael Kretzschmar, Ruel A. Overfelt, Kenneth R. Sloan, Alec Yasinsac, *Using 3D printers as weapons,* International Journal of Critical Infrastructure Protection (IJCIP), Volume 14, pp. 58-71. http://dx.doi.org/10.1016/j.ijcip.2015.12.004; impact factor 1.351.

Zekai Demirezen, Murat M. Tanik, Mehmet Aksit, and Anthony Skjellum, *An Information Theory-based Representation of Software Design,* Integrated Computer-Aided Engineering Journal (ICAE), Volume 21, Number 3, 2014, pp. 235-247, impact factor 3.370.

Joel P Tully, Aubrey E Hill, Hadia M Ahmed, Ryan Whitley, Anthony Skjellum and M Shahid Mukhtar. Expression-based network biology identifies immune-related functional modules involved in plant defense. BMC Genomics 2014, 15:421 doi:10.1186/1471-216415-421, impact factor 4.40.

Zhiwei Sun, Anthony Skjellum, Lee Ward, and Matthew L. Curry. 2014. *A Lightweight Data Location Service for Nondeterministic Exascale Storage Systems*. Trans. Storage 10, 3, Article 12 (August 2014), 22 pages. DOI=10.1145/2629451 http://doi.acm.org/10.1145/2629451 .

Matthew L. Curry, Anthony Skjellum, H. Lee Ward, and Ron Brightwell*, Gibraltar: A Library for RAID-Like Reed-Solomon Coding on Programmable Graphics Processors,* Concurrency and Communication: Practice and Experience, December 2011, 23(18): 2477-2495.

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Zekai Demirezen, Barrett Bryant, Anthony Skjellum, and Murat M. Tanik, *Design Space Analysis in Model-Driven Engineering,* Journal of Integrated Design & Process Science, Volume 14, Number 1, March 2010, pp. 1-15.

Chun Wei, Alan Sprague, Gary Warner, Anthony Skjellum: *Mining spam email to identify common origins for forensic application.* SAC 2008: 1433-1437

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Skjellum, A., A. Kanevsky, Y. Dandass, et al, *The MPI/RT 1.0 Real-Time Message Passing Standard,* Concurrency and Computation Practice and Experience *16*(S1): 0-322 (2004), pp. 0-322, December 2004.

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Rajanikanth Batchu Yoginder S. Dandass, Anthony Skjellum, Murali Beddhu: MPI/FT: A Model-Based Approach to Low-Overhead Fault Tolerant Message-Passing Middleware. Cluster Computing 7(4): 303-315 (2004

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Skjellum, A, R. Dimitrov, S. Angaluri, D. Lifka, G. Coulouris, P. Uthayopas, S. Scott, R. Eskicioglu, *Cluster Computing White Paper, "Operating Systems" paper, Mark Baker, ed, Spring 2001 issue of Int. Journal of High Performance Computing Applications.*

Protopopov, B., and A. Skjellum, "A Multithreaded Message Passing Interface (MPI) Architecture: Performance and Program Issues," *Journal of Parallel and Distributed Computing*, Vol. 61, No. 4, April 2001, pp. 449-466. [52 citations on Google Scholar as of January 2019].

Skjellum, A., D.G. Wooley, Z. Lu, M. Wolf, P.V. Bangalore, A. Lumsdaine, J.M. Squyres, and B. McCandless, "Object-Oriented Analysis and Design of the Message Passing Interface," *Concurrency and Computation: Practice & Experience,* Vol. 13, No. 4, 10 April 2001, pp. 245-292.

Protopopov, B., and A. Skjellum, "Shared-Memory Communication Approaches for an MPI Message-Passing Library," *Concurrency: Practice & Experience*, Vol.12, No. 9, 2000, pp. 799-820.

Carpenter, B., V. Getov, G. Judd, A. Skjellum, and G. Fox, "MPJ: MPI-Like Message Passing for Java," *Concurrency: Practice & Experience,* Vol. 12, No. 11, 2000, pp. 10191038. [228 citations per Google Scholar as of December 2022].

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Skjellum, A., *MPI: A Message-Passing Interface Standard*, International Journal of Supercomputer Applications and High Performance Computing, Vol. 8, No. 3/4, 1994, pp. 311-356.

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Doss, N., G. Henley, and A. Skjellum, "BDMD: A Debugger for Myrinet Control Programs," Technical Report No. MSSU-EIRS-ERC-97-4, NSF Engineering Research Center, February 1997.

Skjellum, A., S.G. Smith, C.H. Still, and R.D. Falgout, "The Multicomputer Toolbox," *Laboratory Directed Research and Development*, Technical Report No. UCRL-53689-92, Lawrence Livermore National Laboratory, University of California, February 1993.

Grant, Brian K., and Anthony Skjellum, "The PVM Systems: An In-Depth Analysis and Documenting Study: Concise Edition," Lawrence Livermore National Laboratory Technical Report NO. UCRL-JC-112016, August 1992.

Skjellum, Anthony, and Chuck Baldwin, "The Multicomputer Toolbox: Scalable Parallel Libraries for Large-Scale Concurrent Applications," Technical Report No. UCRL-JC109251, Lawrence Livermore National Laboratory, University of California, December 1991.

Skjellum, A., and M. Morari, "Zipcode: A Portable Multicomputer Communications Library for High-Performance Computing: Practice and Experience," Technical Report, Lawrence Livermore National Laboratory, University of California, March 1991.

Crawford, G. III, Y. Dandass, and A. Skjellum, "The JMPI Commercial Message Passing Environment and Specification: Requirements, Design, Motivations, Strategies, and Target Users."

Selected Presentations

Workshops

Skjellum, A., R. Batchu, Y. Dandass, and M. Beddhu, "MPI/FT: A Model-Based Approach for Low-Overhead Fault-Tolerance," 1st Sandia/CSRI Fault Tolerance Workshop, Albuquerque, NM, June 10, 2002.

Skjellum, A., Hebert, S., A. Kanevsky, and Z. Cui, "MPIDC99 Tutorial on MPI/RT," Third MPI Developers and Users Conference, Atlanta, March 1999 (half-day tutorial).

Skjellum, A., and P. Bangalore, "MPIDC99 Tutorial on MPI-2," Third MPI Developers and Users Conference, Atlanta, March 1999, (half-day tutorial).

Skjellum, A., and P. Bangalore, "SIAM Tutorial on MPI-2," SIAM 9th Conference On Parallel Processing for Scientific Computing, San Antonio, March 1999, (half-day tutorial).

Skjellum, A., and P. Bangalore, "IPPS Tutorial on High Performance Computing," IPPS'97, Geneva, Switzerland, April 1997 (half-day tutorial).

Skjellum, A., and P. Bangalore, "IPPS Tutorial on MPI," IPPS'97, Geneva, Switzerland, April 1997 (half-day tutorial).

Skjellum, A., "Design and Development of Real-Time Message Passing Interface (MPI/RT) Standard," High Performance Embedded Computing Workshop, September 1997.

Skjellum, A., "A Second Talk about MPI," SCRI Cluster Workshop '93, Florida State University, December 8, 1993.

Skjellum, A., "Writing Parallel Libraries with MPI," AMPI: A Message Passing Interface Mini-Symposium, Supercomputing 1993, Portland, OR, November 19, 1993.

Skjellum, A., "Message Passing Systems: Portability, Capability, Performance, Standards," The First CRPC Workshop on Standards for Message Passing in a Distributed Memory Environment, Williamsburg, VA, April 1992 (invited presentation).

"The Reactive Kernel and Cosmic Environment: Native and Emulated Systems for Medium-Grain Multicomputers and Workstation Networks." The First CRPC Workshop on Standards for Message Passing in a Distributed Memory Environment, Williamsburg, VA, April, 1992 (invited presentation).

Invited Lectures
"MPI 4: An Exascale Message Passing Strawman Standard," Sandia National Laboratories, April, 2011.

"Gibraltar GPU RAID", EMC Technical Talk, co-presented with Matthew Curry, November 8, 2010, Cambridge, Mass.

"MPI-3: Evolution, Revolution, or Status Quo," Sandia National Laboratories, June 12, 2002.

"Efficient Implementations of MPI," Lawrence Livermore National Laboratory, February 16, 1995.

"The National High Performance Distributed Computing Consortium," Lawrence Livermore National Laboratory, October 21, 1993.

"MPI: An Effort to Standardize Multicomputer Message Passing," Los Alamos National Laboratory, CNLS Seminar, July 6, 1993 (also presented at NASA Ames, August 18, 1993; and Lawrence Livermore National Laboratory, August 19, 1993).

"Building Parallel Libraries and Applications in the MPP Environment," Lawrence Livermore National Laboratory, August 17, 1993.

 "The Multicomputer Toolbox: First-and Second-Generation Scalable Libraries and Algorithms Research," Sandia National Laboratories, Massively Parallel Computing Research Laboratory, June 2, 1993 (also presented at Argonne National Laboratories, September 7, 1993).

University Service

At UTC
Computer Science and Engineering, Search committee Chair, 2022-23

At Auburn
Computer Science and Software T&P Committee, 2014-2017.
Computer Science and Software Engineering Recruitment Committee, 2016-2017.

At UAB
Chair, University-wide Committee, "Research Capacity Building Committee," 20092014.
Organized and Led Training sessions for NSF Career Award Submissions: provided inservice workshops for Professors seeking NSF CAREER awards, 2008-2014.

At Mississippi State
Computer Science Department/Research Center Liaison Committee, 2001-02
          - Chairman, 2001-02
Computer Science Faculty Search Committee, 1997-98, 1999-00 Computer Science Facilities Committee, 1998-02
          - Chairman, 1998-99, 2000-01
Computer Science *Ad Hoc* Committee on Graduate Student Concerns, 2001-02
Computer Science Affiliation Agreements Committee, 1999-00
Computer Science *Ad Hoc* Committee on Target Schools, 2000-01
Computer Science Strategic Planning Committee, 2000-01

Courses Taught

        At Auburn
COMP 5350/6350/6356 – Digital Forensics
       COMP 5370/6370/6376 – Computer and Network Security

At UAB
CS 306 Object-oriented Perl Programming
CS 420/520 Software Engineering
CS 436/636 Computer Security
CS 434/634 Parallel Computing

CS 620/630 Bioinformatics I/II (Coordinator)
CS 499 Senior Capstone
CS 591/691 Virtualization
CS 680/780 Foundations of Numerical Computing
CS 334/534 Introduction to TCP/IP

At Mississippi State University
CS 9133 Parallel Scientific Computing
CS 8733 Advanced Systems Programming
CS 4992/6992 Advanced Programming Using C++
CS 3183 Systems Programming
CS 4812/6812 Computer Systems Laboratory I
CS 4743/6743 Operating Systems II
CS 4192/6192 Computer Systems Laboratory II
CS 4163/6163 Design of Parallel Algorithms
CS 4153/6153 Data Communications and Networking
CS 1213 Fortran for Scientists and Engineers

Students Advised or on Committee (Currently)

UTC Ph.D. students [advisor]:   Amani Altarawneh, Sai Medury (transfers from
Auburn)
Chang Phoung

Auburn Ph.D. students [co-advisor or committee]:
Ujan Mukhopadhyay,
Janice Canedo, Rodrigo Sardinas, Yien Wang,
Jason Cuneo, Rodney Visser, Heba Alawneh,
Hamza Alkofahi, Heba Alawneh, Pinchen Chen, Nawrin Sultana

Students Advised (Graduated)

Postdoctoral Fellow at UAB (2013-14): Zekai Demirezen
Postdoctoral Fellow at UTC (2018-19): Ryan Marshall

Ph.D. students advised (with degrees granted):

At UTC:
Amani Altarawneh (2021), Sai Medury (2023)

At Auburn (mentored, others were major professors after I moved to UTC):
Nawrin Sultana (2021), Pinchen Cui (2021), Hamza Alkafohi (2020), Heba Alawneh (2020)

At UAB:

Hadia Ahmed (2017) [mentored; advised by P. Pirkelbauer], Amin Hassani
(2016) [mentored, advisor P.V. Bangalore], Zhiwei Sun (2013), Zekai Demirezen
(2012), Brad Wardman (2011), Matthew Curry (2010), Vetria Byrd (2010),
Zhijie Guan (2005)

At Mississippi State:

Rossen Dimitrov, Manoj Apte, Purushotham V. Bangalore, Boris V. Protopopov, Yoginder
Dandass

Master's students advised:

At UTC:

Grace Nansamba (2020), Evelyn Namugwanya (2021), Thomas Gorham (2022), Riley Shipley
(2021), Savannah Camp (2022), Evan Suggs (2023)

At Auburn:

Bruce Payne (2015), Carlos Lemus (2016), Jared Ramsey (2016),
Ankit Singh (2016), Hamza Alkofahi (2016), Ananya Ravipati (2017), Sai Medury
(2017), Pinchen Cui (2017)

At UAB:

Amin Hassani (2014), Hadia Ahmed (2013), Matthew Farmer (2013),
Alex Filby (2013), Evana Rahaman, (2011), Saoni Mukherjee (2011), Yin Liu
(2005)

At Mississippi State:

Wenhao Wu, MS 2003
Vijay Velusamy, MS, 2003
Diane Mosser-Wooley, MS 2002
Kumaran Rajaram, MS 2002
Jothi Padmanabhan Neelamegam, MS 2001
Xinyan Zan, "A Real-Time Message Layer Over Myrinet Networks," August 2000.
Srigurunath "Ecap" Chakravarthi, "Predictability and Performance Factors Influencing the
Decision of Real-Time Messaging Layers," May 2000.
Matthew Gleeson, December 2000
Lubomir Birov, " C++ As A High Performance Language for Vector, Signal, and Image
Processing Libraries," August 1999.
Zhenqian Cui, "A Study of Quality of Service Communication for High-Speed
Packet- Switching Computer Sub-Networks," May 1999
Ajitha Choudary, May 1998
Rossen Dimitrov, "A Windows NT Kernel-Mode Device Driver for PCI Myrinet LANai 4.x
Interface Adapters," May 1997.
Jin Li, May 1996

Ziyang Lu, PhD (MS 1996)
Mark Rauschkolb, May 1995
Purushotham V. Bangalore, "The Data-Distribution-Independent Approach to Scalable Parallel Libraries," May 1995
Chandrashekar Laveti, 1995
Ron Brightwell, 1995
Nisreen Ammari, graduated 2003
Raghu Angadi, graduated 2002
Srihari V. Angaluri, graduated 2004
Rajanikanth Batchu, graduated 2003
Mangayarkarasi Dhandapani, graduated 2003
Shanthisowjownya Kottakotta, graduated 2003
Ranjith Balachandran, graduated 2003
Changzheng Rao, graduate 2003
Ravi Vadapalli, graduated 2002

Joseph D. Dumas II
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E-mail: Joe-Dumas@utc.edu

PROFESSIONAL EXPERIENCE

University of Tennessee at Chattanooga, Chattanooga, TN (1993 - present)

College of Engineering and Computer Science

UC Foundation Professor, 2005-present
UC Foundation Associate Professor, 1999-2005
UC Foundation Assistant Professor, 1997-1999
Assistant Professor, 1993-1997

Interim Department Head, August 2018-July 2019; *Associate Department Head*, August 2019-present; *Graduate Program Coordinator for Computer Science*, August 2004-August 2008, August 2016-August 2018; *Departmental Course Scheduling Coordinator*, January 2007-present; *Special Assistant to the Dean of the Graduate School*, May 2008-August 2010; *Acting Head of the Computer Science and Engineering Department*, May 2007-July 2008; *Outstanding Computer Science Teaching Award*, December 1998, November 2002, April 2009; *CSE Star Service Award*, April 2013; *CSE Outstanding Service Award*, April 2016, April 2018, April 2020, October 2021; *CSE Outstanding Advising Award*, April 2017. Courses taught at UTC include: Computer Architecture; Advanced Computer Architecture; Embedded Microcontroller Systems; Real-Time Embedded Systems; Advanced Computer Systems; Mini/Micro Computer Systems; Graduate Project; Group Software Project; Digital Logic and Introduction to Computer Hardware; Computer System Organization and Assembly Language Programming; Fundamentals of Computer Science I; Introduction to Computing; Microprocessors and Digital Logic; Microcomputer Applications; and Departmental Honors.

NASA Marshall Space Flight Center, Huntsville, AL (1996, 1997, 2000, 2001)

Summer Faculty Fellow
Integrated a man-in-the-loop virtual environment simulation of the operation of the Space Shuttle Remote Manipulator System robotic arm. Wrote data acquisition and TCP/IP network communications software for PC and Silicon Graphics platforms. Developed simulation management and sensor interface code using Sense8's *WorldToolKit*. Integrated specialized virtual reality peripheral devices with Division's *dVISE* and Transom *Jack* to support human motion capture, virtual reality simulations, and human factors studies for the space program. Developed an innovative glove-based user interface for virtual environments.

UCF Institute for Simulation and Training, Orlando, FL (1993)

Graduate/Postdoctoral Research Assistant, Visual Systems Laboratory
Investigated transport delay measurement and compensation approaches for position trackers and visual displays used in virtual reality simulation environments.

University of Central Florida, Orlando, FL (1989 - 1993)

Graduate Research Assistant/Graduate Teaching Assistant,
Department of Electrical and Computer Engineering
As a research assistant, performed hardware design and interfacing as well as software development for a research project involving digital computer simulation of motor vehicle dynamics. Courses taught: Computer System Design (senior level); Digital Control Systems laboratory (senior level).

Mississippi State University, Starkville, MS (1986 - 1989)

Graduate Research Assistant/Graduate Teaching Assistant, Department of Electrical Engineering
As a research assistant, performed hardware design, troubleshooting, and evaluation, architectural evaluation, and MC68020 assembly language programming for the Mapped Array Differential Equation Machine (MADEM) multicomputer research project. Courses taught: Control System Technology (for Electrical Engineering Technology); Electronic Technology III (for EET); Electrical Engineering Design Laboratory (senior level); Digital Devices laboratory.

University of Southern Mississippi, Hattiesburg, MS (1985 - 1986)

Visiting Instructor, Department of Engineering Technology
Courses taught: Digital Logic lecture and laboratory (for Computer Engineering Technology); Microprocessor Systems laboratory (for CET, senior level); Control Systems laboratory (for Electronic Engineering Technology, senior level); Network Analysis laboratory (for EET, senior level).

Seismic Engineering Company, Dallas, TX (1984 - 1985)

Product Line Engineer
Designed and prototyped custom interface hardware and custom software for a Z80 microprocessor-based controller of seismic data acquisition devices and other peripheral equipment. Provided customer support for the peripheral equipment controller product line. Designed, built, and repaired small test fixtures for analog and digital circuits. Solved component selection and substitution problems for manufacturing.

University of Southern Mississippi, Hattiesburg, MS (1981 - 1983)

Part-Time Faculty Replacement, Department of Engineering Technology

Assisted faculty members with coordination of laboratory activities and evaluation of student work. Assisted students with laboratory work. Calibrated and maintained test equipment.

EDUCATION

University of Central Florida, Orlando, FL (1989 - 1993)

Ph.D. degree in Computer Engineering, May, 1993. 3.94 GPA. Primary research and coursework area: Digital computer simulation of continuous systems. Dissertation: "Measuring and Compensating for Transport Delay in a Real-Time Interactive Driving Simulator." Awarded Link Foundation Fellowship in Advanced Simulation and Training for 1991-92 academic year.

Mississippi State University, Starkville, MS (1986 - 1989)

M.S. degree in Electrical Engineering with emphasis in Digital Computing Systems, May, 1989. 4.00 GPA. Master's thesis: "Hardware Support for High-Performance Message-Passing Communications in the MADEM Multicomputer." Elected to membership in Tau Beta Pi, national engineering honor society, and Eta Kappa Nu, electrical engineering honorary association.

University of Southern Mississippi, Hattiesburg, MS (1979 - 1984)

B.S. degree in Electronic Engineering Technology with minor in Computer Science, awarded *summa cum laude* (4.00 GPA) in May, 1984. Senior Honors thesis: "Transformerless Audio Power Amplifier with Darlington Outputs." Elected to membership in Omicron Delta Kappa, national leadership honor society. Charter member and first president of Alpha Mississippi chapter of Tau Alpha Pi, national engineering technology honor society.

PROFESSIONAL SOCIETY MEMBERSHIPS

IEEE Computer Society

> UTC IEEE-CS student branch counselor, 2000-07; co-counselor, 2010-2013
> Chattanooga IEEE-CS chapter second vice chair, 2000-03
> Chattanooga IEEE section director (member of Executive Committee), 1996-98
> Chattanooga IEEE-CS chapter chair, 1995-96
> Chattanooga IEEE-CS chapter vice chair, 1994-95

PUBLICATIONS

Dumas, Joe. "Accuracy of Garmin GPS Running Watches over Repetitive Trials on the Same Route," *International Journal of Computer Science and Information Technology*, Vol. 14, No. 1, February, 2022.

McPherson, Connor; Dumas, Joe; Gunasekera Sumith; and McCullough, Claire. "Mutually Exclusive: A Survey of Ethical Decision Making in Technology," *Journal of Computing Sciences in Colleges*, Vol. 36, No. 5, January, 2021.

Dumas, Joe and McCullough, Claire. "Effects of Gender on Student Performance in an Introduction to Operating Systems Course," *Journal of Computing Sciences in Colleges*, Vol. 34, No. 2, December, 2018.

Dumas, Joe. "From Introduction to Operating Systems to Computer Architecture: Does an Online Prerequisite Course Prepare Students Better?" *Journal of Computing Sciences in Colleges*, Vol. 33, No. 2, December, 2017.

Dumas, Joseph D. II. *Computer Architecture: Fundamentals and Principles of Computer Design (Second Edition)*, copyright 2017 by CRC/Taylor & Francis Group, ISBN-13: 978-1498772716.

Dumas, Joseph D. II. *Solutions Manual for Computer Architecture: Fundamentals and Principles of Computer Design (Second Edition)*, copyright 2017 by CRC/Taylor & Francis Group, ISBN-13: 978-1498772754.

Dumas, Joe. "Online vs. Face-To-Face Student Performance in an Introduction to Operating Systems Course," *Journal of Computing Sciences in Colleges*, Vol. 32, No. 2, December, 2016.

Dumas, Joseph. Chapter 22, "Performance Enhancements" in *Computing Handbook, Third Edition: Computer Science and Software Engineering* edited by Teofilo Gonzalez, Jorge Diaz-Herrera, and Allen Tucker; copyright 2014 by Chapman and Hall/CRC, ISBN 978-1-4398-9852-9.

Dumas, Joseph. "Learning With 'Hands-On' Computer Architecture Projects When You Don't Have Real Hardware" presented at the Consortium for Computing Sciences in Colleges: Southeastern conference, November, 2013.

Dumas, Joseph. *CPSC/CPEN 305, Digital Logic and Introduction to Computer Hardware: Course and Lab Workbook*, published through UTC Bookstore, most recent edition August, 2008.

Dumas, Joseph D. II. *Computer Architecture: Fundamentals and Principles of Computer Design*, copyright 2006 by CRC/Taylor & Francis Group, ISBN 0-8493-2749-0.

Dumas, Joseph D. II. *Solutions Manual for Computer Architecture: Fundamentals and Principles of Computer Design*, copyright 2006 by CRC/Taylor & Francis Group, ISBN 0-8493-9171-7.

Tyler, Thomas R.; Novobilski, Andy; Dumas, Joe; and Warren, Amye. "The Utility of Perspecta 3D Volumetric Display for Completion of Tasks," Human Vision and Electronic Imaging X, Proc. SPIE, Vol. 5666, January, 2005.

Hamilton, George S.; Dumas, Joseph D.; Brookman, Stephen; and Tilghman, Neal. "Evaluating the Usability of Pinchigator, a System for Navigating Virtual Worlds Using Pinch Gloves," *Proceedings of the Huntsville Simulation Conference*, October, 2003.

Dumas, Joseph; Novobilski, Andrew; Ellis, Dawn; and Paschal, Mark. "VR on a Budget: Developing a Flight Simulator in a Small Institution with Off-The-Shelf Hardware and Open Source Software," *Journal of Computing Sciences in Colleges*, Vol. 18, No. 2, December, 2002.

Dumas, Joseph. "Human Motion Tracking and Glove-Based User Interfaces for Virtual Environments in ANVIL, "*Research Reports: 2001 NASA/ASEE Summer Faculty Fellowship Program*, National Aeronautics and Space Administration, report number NASA/CR-2002-211840, July, 2002.

Dumas, Joseph. "Peripheral Device Interfaces to Support Virtual Reality Applications and Human Factors Studies in ANVIL," *Research Reports: 2000 NASA/ASEE Summer Faculty Fellowship Program*, National Aeronautics and Space Administration, report number NASA/CR-2001-210797, September, 2001.

Dumas, Joseph. "Virtual Environment User Interfaces to Support RLV and Space Station Simulations in the ANVIL Virtual Reality Lab," *Research Reports: 1997 NASA/ASEE Summer Faculty Fellowship Program*, National Aeronautics and Space Administration, report number NASA/CR-1998-208803, September, 1998.

Dumas, Joseph; Hale, Joseph; and Dabney, Richard. "Integration of the Space Shuttle Remote Manipulator System Virtual Environment Simulation," *Proceedings of the 1997 IEEE International Conference on Systems, Man, and Cybernetics*, Vol. 5, October, 1997.

Dumas, Joseph, and Klee, Harold. "Time Delay Measurement in a Real-Time Simulation Environment," Society for Computer Simulation *Transactions*, Vol. 14, No. 3, September, 1997.

Dumas, Joseph. "Integration of the Shuttle RMS/CBM Positioning Virtual Environment Simulation," *Research Reports: 1996 NASA/ASEE Summer Faculty Fellowship Program*, National Aeronautics and Space Administration, report number NASA-CR-205205, October, 1996.

Dumas, Joseph, and Klee, Harold. "Design, Simulation and Experiments on the Delay Compensation for a Vehicle Simulator," Society for Computer Simulation *Transactions*, Vol. 13, No. 3, September, 1996.

Klee, Harold, and Dumas, Joseph. "Theory, Simulation, Experimentation: An Integrated Approach to Teaching Digital Control Systems," *IEEE Transactions on Education*, Vol. 37, No. 1, February, 1994.

GRANTS RECEIVED

UTC Faculty Development Grant (sabbatical leave for Spring semester 2016), January, 2015; $47,086.

Equipment Donation, National Aeronautics and Space Administration, Marshall Space Flight Center, November, 2010; $228,393.

Equipment Donation, Sun Microsystems, November, 2008; $24,995.

Academic Excellence Grant, Sun Microsystems, March, 2007; $3,995.

Equipment Donation, National Aeronautics and Space Administration, Marshall Space Flight Center, June, 2004; $110,965.

Lupton Renaissance Grant for "Enhanced Information Perception through Virtual Reality," University of Chattanooga Foundation, April, 2003; $69,900 (co-PI with Dr. Andy Novobilski).

UTC Faculty Development Grant (sabbatical leave for Fall semester 2003), February, 2003; $30,600.

External grant for development of a virtual reality Space Shuttle flight simulator, Wolf Aviation Fund, July, 2001;$9,246 (co-PI with Dr. Andy Novobilski).

NASA Summer Faculty Fellowship, Marshall Space Flight Center, May, 2001; $10,000.

NASA Summer Faculty Fellowship, Marshall Space Flight Center, May, 2000; $10,000.

Software grant from Cypress Semiconductor Corporation, October, 1998; $2,475.

UTC Faculty Development Grant, September, 1997; $844.

NASA Summer Faculty Fellowship, Marshall Space Flight Center, May, 1997; $10,000.

NASA Summer Faculty Fellowship, Marshall Space Flight Center, May, 1996; $10,000.

UTC Instructional Excellence Grant, October, 1993; $1,422.

Equipment Donation, National Aeronautics and Space Administration, Marshall Space Flight Center, November, 2010; $228,393.

Yingfeng Wang

Education
Ph.D. in Computer Science, University of Georgia, Athens, Georgia, 2012
M.S. in Computer Software and Theory, Hohai University, Nanjing, China, 2005
B.S. in Computer Science and Technology, Hohai University, Nanjing, China, 2002

Academic Experience
University of Tennessee at Chattanooga, Chattanooga, TN
Associate Professor, 2020-Present, Full-time
MSDA Computer Science Track Program Coordinator, 2020-Present, Full-time
Middle Georgia State University, Macon, GA
Assistant Professor, 2014-2020, Full-time
Oak Ridge National Laboratory, Oak Ridge, TN
Postdoctoral Research Associate, 2012-2014, Full-time
University of Georgia, Athens, GA
Teaching/Research Assistant, 2008-2011, Part-time
Utah State University, Logan, UT
Research Assistant, 2006-2007, Part-time
Nanjing Normal University, China
Instructor, 2005-2006, Full-time

Non-academic Experience
- Oracle Corporation, Software Developer 2. Developed web applications. 2014, Full-time

Certifications or Professional Registrations
- Certified ScrumMaster

Honors and Awards
- 2022 Outstanding Faculty Teaching Award, Department of Computer Science and Engineering,
- University of Tennessee at Chattanooga.
- 2018-2019 Middle Georgia State University 2018 - 2019 Award for Outstanding Scholarship.
- 2015 Dean's Award for Outstanding Scholarly Activities, School of Information Technology, Middle Georgia State University.
- 2015 NSF/IEEE-TCPP/CDER Center Early Adopter Award, PI.
- 2012 Outstanding PhD Graduate Student Award, Department of Computer Science, University of Georgia
- 2011 Dissertation Completion Award, University of Georgia
- 2011 NSF Student Travel Award for ICCABS
- 2006 Master Thesis "Sensitivity Study of Madalines", awarded the Provincial Excellent Master Thesis of Jiangsu (Advisor: Professor Xiaoqin Zeng)
- 2003-2004 First Class Graduate Scholarship, Hohai University

Service Activities
- Member   Grade Appeals Committee, UTC, 2022 – Present.
- Member   Safety Committee, College of CECS, UTC, 2022 – Present
- Member   Faculty Senate, UTC, 2021 – Present
- Chair   Search Committee of Lecture/Professor of Practice for BAS-ITCyS. 2022
- Chair   Search Committee of Lectures of Computer Science, Spring 2021
- Member   Search Committee of Assistant Professor of MSDA of Business, Spring 2021

- Chair   Curriculum and Assessment Committee MS in Data Analytics (MSDA), Computer Science Track, Fall 2020 – Present
- Member   Undergraduate Curriculum Committee of UTC, Fall 2020 – Spring 2021
- Reviewer   Analytical Chemistry
- Reviewer   BMC Microbiology
- Reviewer   Entropy
- Reviewer   IEEE/ACM Transactions on Computational Biology and Bioinformatics
- Reviewer   IEEE Transactions on Cybernetics
- Reviewer   International Conference on Machine Learning and Computing
- Reviewer   International Workshop on Data Mining in Bioinformatics
- Reviewer   International Journal of Image and Graphics
- Reviewer   International Journal of Machine Learning and Cybernetics
- Reviewer   Journal of Computer Information Systems
- Reviewer   Journal of Medical Artificial Intelligence
- Reviewer   Methods
- Reviewer   Neurocomputing
- Reviewer   Plos One
- Reviewer   Scientific Reports
- Panelist   National Science Foundation
- Co-Editor   IMCIC 2022
- Guest Editor   Frontiers in Aging

Publications and Presentations

- Riazi, A., and **Wang, Y.**, "Using Topological Analysis to Investigate True and False Information Diffusion," Proceedings of the International Conference on Computational Science and Computational Intelligence (CSCI), accepted.
- Qin, H., Tareq, S., Torres, W., Doman, M., Falvey, C., Moore, J., Tsai, M.H., **Wang, Y.**, Hossain, A., Xie, M., and Yang, L., "Cointegration of SARS-CoV-2 Transmission with Weather Conditions and Mobility during the First Year of the COVID-19 Pandemic in the United States," Proceedings of The 18th International Conference on Data Science (ICDATA), accepted.
- Kwak, M., Molina, M., Arnold, S., Woodward, A., An, J., Nuckels, E., and Wang, Y., "Metabolite Fragmentation Visualization," Journal of Systemics, Cybernetics and Informatics, vol. 20, no. 5, pp. 138-147, 2022.
- Sun, C., Kumarasamy, V.K., Liang, Y., Wu, D., and **Wang, Y.**, "Using a Layered Ensemble of Physics-Guided Graph Attention Networks to Predict COVID-19 Trends," Journal of Applied Artificial Intelligence, vol. 36, no. 1, pp. 2055989, 2022.
- Kwak, K., Kang, K., and **Wang, Y.**, "Methods of Metabolite Identification Using MS/MS Data," Journal of Computer Information Systems, vol. 62, no. 1, pp. 12-18, 2022.
- Tsai, M.H., and **Wang, Y.**, "Analyzing Twitter Data to Evaluate People's Attitudes towards Public Health Policies and Events in the Era of COVID-19," International Journal of Environmental Research and Public Health, vol. 18, no. 12, pp. 6272, 2021.

- **Wang, Y.,** Xu, B., Kwak, M., and Zeng, X., "A Noise Injection Strategy for Graph Autoencoder Training," Neural Computing and Applications, vol.33, pp 4807-4814, 2021.
- **Wang, Y.,** Xu, B., Kwak, M., and Zeng, X., "A Simple Training Strategy for Graph Autoencoder," International Conference on Machine Learning and Computing (ICMLC), pp 341-354, 2020.
- Tsai, M., **Wang, Y.,** Kwak, M., and Rigole, N., "A Machine Learning Based Strategy for Election Result Prediction," Annual Conference on Computational Science and Computational Intelligence (CSCI), pp 1408-1410, 2019.
- Kwak, M., Kang, K., and **Wang, Y.,** "Methods of Metabolite Identification Using MS/MS Data," Journal of Computer Information Systems, published online.
- Zeng, X., Liu, Y., Shi, Z., **Wang, Y.,** Zou, Y., Kong, J., and Zhang, K., "Edge-Based Graph Grammar: Theory and Support System," Journal of Visual Languages and Sentient Systems, vol. 4, pp. 28, 2018.
- Andrade, P., and **Wang, Y.,** "A Graphical User Interface for Designing Graph Grammars," Proceedings of Annual Conference of the Southern Association for Information Systems (SAIS), pp 9, Mar. 2018.
- **Wang, Y.,** Wang, X., and Zeng, X., "MIDAS-G: A Computational Platform for Investigating Fragmentation Rules of Tandem Mass Spectrometry in Metabolomics," Metabolomics, vol. 13, no. 10. pp. 116, 2017.
- Girard, J., Breese, J., and **Wang, Y.,** "Hospital Technology Integration in Southern US States," Proceedings of Annual Conference of the Southern Association for Information Systems (SAIS), paper 24, Mar. 2016.
- Wang, X., and **Wang, Y.,** "Discrete Mathematics Education for Information Technology Students," Computer Education, no. 4. pp. 16-20, 2016.

Recent Grants
- **PI**, "III: Small: RUI: Investigating Fragmentation Rules and Improving Metabolite Identification Using Graph Grammar and Statistical Methods," **National Science Foundation (NSF)**, Award No: 2053286, $284,098.00, 2020 – 2024.
- **Co-PI**, "CC* Compute: Augmenting a 2,560-core EPYC2 Computational Cluster with GPUs for AI, Machine Learning, and other GPU-Accelerated HPC Applications," **National Science Foundation (NSF)**, Award No: 2201497, $415,868.00, 2022 – 2024. Collaborate with PI Dr. Anthony Skjellum and Co-PIs Dr. Farah Kandah, Dr. Kidambi Sreenivas, and Dr. Eleni Panagiotou.
- **Co-PI**, "REU Site: Interdisciplinary Computational Biology (iCompBio)," **National Science Foundation (NSF)**, Award No: 2149956, $413,526.00, 2022 – 2025. Collaborate with PI Dr. Hong Qin.
- **Co-PI**, "REU Site: ICompBio – Engaging Undergraduates in Interdisciplinary Computing for Biological Research," **National Science Foundation (NSF)**, Award No: 1852042, $435,498.00, 2022 – 2023. Collaborate with PI Dr. Hong Qin.
- **PI**, "III: Small: RUI: Investigating Fragmentation Rules and Improving Metabolite Identification Using Graph Grammar and Statistical Methods," **National Science Foundation (NSF)**, Award No: 1813252, $479,584.00, 2019 – 2020. Collaborate with Co-PI Dr. Myungjae Kwak. (This grant is transferred to the NSF grant with Award No. 2053286)

Professional Development

- Write Winning Grant Proposals, Online Seminar, Jan. 28-29, 2021
- Machine Learning in Genomics: Tools, Resources, Clinical Applications and Ethics, NIH Online Seminar, Apr. 13-14, 2021
- Grant Software Seminar, Macon, GA, Aug. 23rd, 2018
- The second annual Academic Cybersecurity Seminar, Macon, GA, Feb. 21st, 2018
- Advising Training, Macon, GA, Jan. 26th, 2018
- NSF Career Award Writing Webinar, Georgia College and State University, Jan. 9th, 2018
- Undergraduate Research Summit, Middle Georgia State University, Aug. 8th, 2017
- MyDegree Training, Middle Georgia State University, Feb. 22nd, 2017

VITAE

1. NAME: HONG QIN

2. EDUCATION
Ph.D. Biochemistry and Molecular Biology, University of Chicago, December 2001
     Dissertation: Modular construction of RNase P. Advisor: Dr. Tao Pan
M.S. Computer Science, Loyola University of Chicago, May 2002
     GPA 3.8, 30 credit hours. Completed projects using JAVA, C, C++, SQL and LISP.
M.S. Biophysics, Tsinghua University, China, May 1994
     Thesis: Three-dimensional reconstruction of protein structures using EM and image processing
     techniques. Advisor: Dr. Sen-Fang Sui
B.S. Biological Sciences and Biotechnology, Tsinghua University, China, May 1991

3. ACADEMIC EXPERIENCE
Au 2022 – present,   Professor, Dept of Computer Science & Engineering, Dept of Biology, Geology
                         & Environmental Science, and SimCenter, University of Tennessee at
                         Chattanooga.
Aug 2016 – 2022   Associate Professor, Dept of Computer Science & Engineering, Dept of Biology,
                         Geology & Environmental Science, and SimCenter, University of Tennessee at
                         Chattanooga.
October 2017 – present   Adjunct faculty, Dept of Internal Medicine, College of Medicine Chattanooga,
                         University of Tennessee Health Science Center.
Sep 2015 – July 2016   Associate Professor with tenure, Department of Biology, Spelman College
Aug. 2009 – Aug 2015   Assistant Professor, Department of Biology, Spelman College
Jun.-Jul., 2013   Summer Sabbatical Fellow, University of Tennessee, Knoxville, National
                         Institute of Mathematical and Biological Synthesis (NIMBioS)
Jun. - Aug., 2011   Visiting Faculty, Lewis Stigler Genome Institute, Princeton University
Jun. - Aug., 2010   Visiting Faculty (Undergraduate Faculty Research Residency),
                         Fred Hutchinson Cancer Research Center, Seattle, WA 98109
Feb. 2007 - Aug., 2009   Assistant Professor, Tuskegee University, joint appointment between
                         Department of Agricultural and Environmental Sciences, and
                         Department of Biology
Jul.-Dec., 2006   Postdoctoral Associate, University of Tennessee, Knoxville
                         Department of Ecology and Evolutionary Biology
                         Advisor: Michael Gilchrist.
Jan. 2004 - Jun., 2006   Research Assistant Professor, University of Rochester
                         Department of Biostatistics and Computational Biology
Oct. 2001- Dec., 2003   Postdoctoral Associate, University of Chicago
                         Department of Ecology and Evolution
                         Advisor: Wen-Hsiung Li.

4. NON-ACADEMIC EXPERIENCE
Frank Lloyd Write Foundation, Frederick C. Robie House, Chicago, Volunteer Tour Guide,
approximately 1997 ~ 2003.
United Nations Industrial Development Organization, Beijing, Interpreter, Full-time, 1994 March~ May.

5. CERTIFICATE OR PROFESSIONAL REGISTRATIONS
None

6. CURRENT MEMBERSHIP IN PROSSIONAL ORGANIZATIONS

- International Conference on Intelligent Biology and Medicine

7. HONORS AND AWARDS

Honors and recognitions

- 2022, Winner, Healthy Longevity Global Grant Challenge, US National Academy of Medicine

- 2020 Spring, Outstanding Faculty Research, Department of Computer Science and Engineering, UTC

- 2019 Spring, Outstanding Faculty Research and Creative Achievement, College of Engineering and Computer Science, UTC.

- 2017, Faculty Mentoring Fellow, Quantitative Undergraduate Biology Education & Synthesis (QUBES)

- 2016, William A. Hinton Research Training Award, American Society for Microbiology.

- 2014 FASEB MARC faculty/mentor travel award for the 2014 Yeast Molecular Genetic Meeting.

- 2003 Travel award to attend the Gordon Research Conference on Evolutionary & Ecological Functional Genomics, NH, June 2003.

- 1991, Outstanding graduate, Tsinghua University.

- 1986, Highest score in college entry exam in a city with 4.5 million people.

AWARDS

- PI, NSF PIPP Phase 1. Prediction and Prevent future coronavirus pandemics. $1M, 2022.

- Co-PI. NSA CAE-C, Remote Live Forensics for Smart Mobile Devices at Scale. PI M. Xie, Co-PI, Yang. $149,993 Submitted on June 12, 2020. Awarded.

- PI, NSF DGE #1663105, "Collaborative Research: SFS Program: Strengthening the National Cyber Security Workforce". $1.33M, Jan 2017-Dec 2021. Former PI Yang. Qin as PI since fall 2019.

- PI, NSF DBI #1852042 "REU Site: ICompBio – Engaging Undergraduates in Interdisciplinary Computing for Biological Research". ~ $359K. April 2019-March 2022, awarded.

- PI, NSF IIS #1761839 "Spokes: MEDIUM: SOUTH: Collaborative: Integrating Biological Big Data Research into Student Training and Education", $1M, ~$550K to UTC, Oct 2018 – Sep, 2021, awarded.

- PI, NSF award #1602594. Conference: A strategic planning workshop to explore quantitative biology as a vehicle for broad participation. ~ $41K. Dec 15 2015 – Nov 30, 2016, awarded.

- PI, NSF MCB Award #1453078 (transferred to 1720215) CAREER: A probabilistic gene network model of cellular aging and its application on the conserved lifespan extension mechanism of dietary restriction. $611K, April 2015-March 2020, awarded.

- Co-PI, NSF, MCB, Problem-based learning modules for systems biology (PI, Eberhard Voit, Georgia Tech), $500K. Award #1517588, $500K ($58.9K to Spelman College), 2015- 2018, awarded.

- PI, FASEB MARC Faculty/Mentor Travel award. May 2014, awarded. ~$5.5K. Two Spelman students, Keyana Scott and Zhane Cruickshank, are co-applicants.

- PI, NIMBioS sabbatical fellowship. Summer 2013. ~$10K

    Applications for sabbatical fellowship at the National Institute for Mathematical and Biological Synthesis are reviewed rigorously by external experts.
- Fellowship, Quality Education for Minorities (QEM) Network, Faculty Development Program, 2011~2012. ~$30K

- PI, NSF MCB "RUI: Testing the network hypothesis of cellular aging in *Saccharomyces cerevisiae*." Award #1022294, September 1, 2010 – August 31, 2013, $293K. NSF MCB program usually funds 10~15% of the submitted proposals. This proposal was rated as high priority by the panel.

- Co-PI, "Simulating the transmission of infectious disease". Collaborative Research Experience for Undergraduates, (PI Li Yang, co-PI, Nagambal Shah) $23K. 2010-2011

- PI, NSF "CCLI: Teaching computing in life sciences through hands-on experience at Tuskegee University", Award #0837075, Jan 2009- Dec 2010, $110K. NSF CCLI program usually funds ~15% of the submitted proposals.

- PI, NIH/NIA R21, "A Genetic Study of Yeast Natural Lifespan Variation", $414,818, 2005

- PI, AFAR, "Genetic Determinants of Lifespan in Natural Yeast Populations", $50K, 2004

8. SERVICE ACTIVITES
PANEL REVIEWER
- NSF review panels, October 2010, April 2011, August 2012, April 2013, March 2015, March 2016, March 2017, March 2018, September 2018, March 2019, October and October, 2020, January, May, and November 2022, January 2023 (expected).

AD HOC REVIEWER
- NSF ad hoc reviewer, 2016, May 2020, spring 2020, spring 2023

- Frontier in Genetics, March 2020

- BMC Bioinformatics, July 2019, May 2020.

- PLOS Computational Biology, March 2019.

- PLOS ONE, July, October 2018, May 2019

- University of Arkansas at Little Rock, June 2018.

- US-Israel Binational Science Foundation, March 2018

- Quantitative Biology, April 2017.

- Problems, Resources, and Issues in Mathematics Undergraduate Studies (PRIMUS), October 2016

- ACM MidSE 2016, September 2016 (Three proposals).

- NSF MCB ad hoc reviewer, 2016.

- Mathematical Bioscience and Engineering, November 2015.

- Journal of Theoretical Biology, November 2015.

- PLOS ONE, October 2015.

- International Journal of STEM Education. May 2015.

Editorial Service
- Academic Editor, PLOS ONE, 2022- present

- Guest editor, IEEE/ACM Transactions on Computational Biology and Bioinformatics, Spring 2021

- Guest editor, Frontiers in Artificial Intelligence, Spring 2021

Service at UTC (since Fall 2016)
- Chair, Tenure and promotion committee, Fall 2019- 2021. Responsible for organizing tenure and promotion review and external reviews according to the faculty handbook and department by-laws.
- Member, College Governance and Assessment Committee, College of Engineering and Computer Science, 2020-2021.
- Member, University General Education Committee, 2020-2021.
- Member, Undergraduate Curriculum Committee, 2019-2020.
- Member, Vice Provost Search Committee, Spring 2020.
- Faculty Senate, Fall 2018 ~ Spring 2020.
- ABET self-study, Fall 2018 – Fall 2019, participation in course mapping and evaluation summaries.
- Proxy representative, Honor College advisory board, Spring 2019.
- Presentation to students in the UTC ASPIRE program, invited by Dr. Ethan Carver, January 24, 2018.
- Member, University Budget and Economic Status Committee, Fall 2017 ~ Spring 2018.
- Served on the Search committee for the Associate Professor position of Chemical Engineering, Fall 2017. Reviewed 44 applicants.
- Served on the Search committee for the Assistant Professor position of Population Genetics, Fall 2017. Reviewed 38 applicants.
- Participated in the planning effort for the Federal Team Campus visit, Fall 2017.
- Served on the search committee for SIMCenter Director. Fall 2016 – Spring 2017.

- Student thesis committees
  Jonah Hall, MS thesis, 2017-2018;
  Mackenzie Davenport, undergraduate honor thesis, 2017-2018.

Professional Workshops/Meetings Organized
- Organizer and instructor. Online student and teacher coding bootcamp to analyze COVID19 data with R and Colab, December 19-23, 2020. ~ 70 participants.

- Co-organizer: BIOKDD 2020 The 19th International Workshop on Data Mining in Bioinformatics, San Diego, CA, August 24, 2020. A workshop in KDD 2020.

- Organizer: NEON coding bootcamp, May 2020. ~45 participants.

- Organizer and instructor: R coding bootcamp and Electronic Health Records analysis bootcamp, July29-Aug2 2019. ~ 45 participants.

Outreach & Community Service
- Educational video production on how to make a computer program run faster, WTCI-TV and PBS at Chattanooga.
- Coach, Science Olympiad, Heredity, Ornithology, Haycock Elementary School, Dec 2020-March 2021
- Guest lecture on COVID19 modeling and prediction, Signal Mountain High School, January 20, 2021.
- Guest lecture. Signal Mountain High School, November 2019. I gave a guest lecture to a dozen high school students on network modeling of cellular aging.
- Faculty mentor, Workplace program for Chattanooga Girls Leadership Academy, Fall 2018 ~ Spring 2019.
- Participation in the Erlanger Hospital shadowing program, Fall 2017 ~ Spring 2019.
- Chattanooga Chamber of Commerce Spirit of Innovation Fair and Luncheon, October 20, 2017.

9. MOST IMPORTANT PULICATIONS AND PRESETATIONS FROM THE PAST FIVE YEARS.

Publications
- Ghafari, M., J. Clark, H. B. Guo, R. Yu, Y. Sun, W. Dang and H. Qin (2021). "Complementary performances of convolutional and capsule neural networks on classifying microfluidic images of dividing yeast cells." <u>PLoS One</u> **16**(3): e0246988.

- Ghafari, M., H.-B. Guo, W. Dang and H. Qin (2020). <u>Prototying a family tree algorithm to estimate yeast replicative lifespan from time-lapse microfluidic images</u>. IEEE SouthEastern Conference, Raleigh, NC.

- Guo, H.-B., Y. Ma, G. A. Tuskan, **H. Qin**, X. Yang and H. Guo (2019). "A Suggestion of Converting Protein Intrinsic Disorder to Structural Entropy Using Shannon's Information Theory." <u>Entropy</u> **21**(6): 591.

- Guo, H. B., M. Ghafari, W. Dang and H. Qin (2021). "Protein interaction potential landscapes for yeast replicative aging." <u>Sci Rep</u> **11**(1): 7143.

- Guo, H. B. and H. Qin (2020). "Association study based on topological constraints of protein-protein interaction networks." <u>Sci Rep</u> **10**(1): 10797.

- Guven, E., S. Akcay and **H. Qin** (2019). "The Effect of Gaussian Noise on Maximum Likelihood Fitting of Gompertz and Weibull Mortality Models with Yeast Lifespan Data." <u>Exp Aging Res</u> **45**(2): 167-179.

- Guven, E., <u>L. A. Parnell</u>, <u>E. D. Jackson</u>, <u>M. C. Parker</u>, N. Gupta, J. Rodrigues and **H. Qin** (2016). "Hydrogen peroxide induced loss of heterozygosity correlates with replicative lifespan and mitotic asymmetry in Saccharomyces cerevisiae." <u>PeerJ</u> **4**: e2671.

- Ledesma, D., C. Powell, J. Shaw and **H. Qin** (2020). "Enabling automated herbarium sheet image post-processing through neural network models for color reference chart detection." <u>Applications in Plant Sciences</u>: Accepted. .

- Powell, C., J. Motley, **H. Qin** and J. Shaw (2019). "A born-digital field-to-database solution for collections-based research using collNotes and collBook." <u>Appl Plant Sci</u> **7**(8): e11284.

- **Qin, H.** (2019). "Estimating network changes from lifespan measurements using a parsimonious gene network model of cellular aging." <u>BMC Bioinformatics</u> **20**(1): 599.

Invited Talks
- Spelman College, online guest talk, January 19, 2021.

- University of Arkansas at Little Rock, online guest lecture, October 16, 2020

- Catholic University of America, Online guest lecture, October 8, 2020

- Erlanger Hospital, January 23, 2020

- Saint Louis University, Saint Louise, MO, September 2018.

- University of Tennessee Health Science Center, Memphis, TN, November 5, 2017.

Conference Presentations
- NSF STEM for ALL Video Showcase, May 2021

- Inspiration talk, annual conference Ecological Society of America (online) August 2020

- Poster, The allied genetic conference, (online) April 2020.

- Poster, UT CORNET Cancer conference, Murfreesboro, November 9, 2016

- Poster, 2016 the allied genetics conference, Orlando, FL. July 13-17, 2016.

- Poster, the 9th Q-bio meeting, Blacksburg, VA, August 5-8, 2015

10. MOST RECENT PROFESSIONAL DEVELOPMENT ACTIVITIES.

- QC40: Physics of Computation Conference 40th Anniversary, May 6, 2021.

- IEEE Quantum Week, November 2020.

- Quality Matters online training course, "Applying the QM Rubric (APPQMR)", September 26 – October 11, 2017. This is two-week intensive online training course.

- Big Genomic Data Skills training for Professor, Jackson Laboratory for Genomic Medicine, Farmington, CT. May 15-19, 2017

- XSEDE HPC workshop on Big Data using Bridges, Knoxville, May 1-2, 2018.
- Biodiversity Big Data Workshop, Smithsonian Institute, December 14-15, 2017
- "21st Century Cures: Southeast Conference", University of Tennessee Knoxville, June 1, 2017
- QCB workshop, Cells as Dynamical Systems, UCSF, May 22-23, 2017
- Workshop on Biological Big Data and Artificial Intelligence, Georgia Tech, December 13-14, 2016
- UT CORNET Cancer conference, Murfreesboro, November 9, 2016
- Regional workshop by the National Institute of Aging, Morehouse School of Medicine, Oct 20, 2016
- High impact applications of data science in precision medicine, health analytic, and health disparities, Georgia Tech, Sep 19-20,2016

Dalei Wu, PhD

Associate Professor
Department of Computer Science and Engineering
The University of Tennessee at Chattanooga
Phone: (423) 425-4386, Fax: (423) 425-5442
Email: dalei-wu@utc.edu

Professional Preparation

Shandong University	Jinan, China	Electrical Engineering	B.Sc., 2001
Shandong University	Jinan, China	Electrical Engineering	M.S., 2004
Univ. of Nebraska-Lincoln	NE, USA	Computer Engineering.	Ph.D., 2010
Massachusetts Institute of Tech.	MA, USA	Mechatronics	Postdoc, 2011-2014

Appointments

2019–present **Associate Professor**
University of Tennessee at Chattanooga, Dept. of Computer Science and Engineering
Chattanooga, TN, USA

2014–2019 **Assistant Professor**
University of Tennessee at Chattanooga, Dept. of Computer Science and Engineering
Chattanooga, TN, USA

2004–2005 **System Engineer**
ZTE Telecom Corporation, WiMAX R&D
Shenzhen, China

Research Interest

- Intelligent Networked Systems, Cyber-Physical Systems
- Complex Dynamic System Modeling, Optimization, and Control

Research Projects

- Department of Energy (DOE), Office of Energy Efficiency and Renewable Energy (EERE), "Developing an Energy-Conscious Traffic Signal Control System for Optimized Fuel Consumption in Connected Vehicle Environments," $1,893,168, 10/2020 - 12/2023, Co-PI.
- NSF "CCRI: New: RUI: Testbed as-a Service: A Sandbox for Fostering Smart and Connected City Research & Development," $1,374,885, 10/01/2021 - 09/30/2024, Co-PI.
- NSF "Collaborative Research: High-Precision Monitoring of Foodborne Pathogens in Food Manufacturing Facilities," $450,000, 01/01/2022 - 12/31/2024, Co-PI.
- National Institute of Food and Agriculture (NIFA) "Incubating Engineers for Food Innovation (iNEST)," $150,000, 09/2021 – 08/2023, Senior Personnel.
- NSF "HDR DSC: Collaborative Research: Transforming Data Science Education through a Portable and Sustainable Anthropocentric Data Analytics for Community Enrichment Program," $723,641, 10/2019 - 09/2022, Co-PI.
- NSF "US Ignite: Collaborative Research: Focus Area 1: Fiber Network for Mapping, Monitoring and Managing Underground Urban Infrastructure," $299,884, 01/2017 - 12/2019, PI

- Tennessee Department of Transportation (TDOT), "Activity-based Household Travel Survey Through Smartphone Apps in Tennessee," $199,989, 02/2019 - 01/2021, Co-PI.
- TDOT, "Rating and Inventory of TDOT Retaining Walls," $149,857, 10/2018 - 07/2020, Co-PI.
- NSF "SFS Program: Strengthening the National Cyber Security Workforce," $1,540,763, 01/2017 - 07/2021, Senior Personnel.
- UTC Undergraduate Research and Creative Endeavor (URaCE) Summer Fellowship in Smart Cities and Urban Systems, $15,000, 05/2018 - 08/2018, PI
- Tennessee Higher Education Commission's Center of Excellence in Applied Computational Science and Engineering (CEACSE): "Multiscale Serviceability Analysis and Assessment of Urban Infrastructure," $95,610, 07/2016 - 06/2017, PI.
- UTC Collaborative Research Initiative for Sponsored Programs (CRISP): "Virtual TaiJi System: An Innovative Rehabilitation Strategy," $8,000, 07/2015 - 06/2016, Co-PI.
- NSF, "Making Opportunities for Computer Science and Computer Engineering Students," $585,020, 07/2013 - 06/2018, Co-PI (replaced Dr. Thompson).

Teaching Experience

Courses Taught: Principle of Data Analytics, Data Visualization and Exploration, Computer Architecture, Advanced Computer Architecture, Digital Logic and Introduction to Computer Hardware, Algorithm Analysis and Advanced Data Structures, Fundamentals of Computer Science, Theory of Computer Programming Languages

Awards and Honors

- Outstanding Service Award, Department of Computer Science and Engineering, UTC, 2022
- Outstanding Teaching Award, Department of Computer Science and Engineering, UTC, 2021
- UC Foundation Professorship, 08/2018
- Outstanding Leadership Award, IEEE Multimedia Technical Committee, 2019
- Smart 50 Awards, Project "Underground Infrastructure Sensing" was recognized as one of global 50 most innovative smart city projects at the Smart Cities Connect Conference & Expo, Kansas City, MO, 03/2018
- Best Paper Award, International Conference on Computing, Networking and Communications (ICNC), Maui, Hawaii, USA, March 2018
- Semi-Finalist Team Member, MIT $100K Entrepreneurship Competition, 2013

Selected Publications

Book Chapters

[1] Y. Liang, D. Wu, D. Ledesma, Z. Guo, E. Kaplanoglu and A. Skjellum, "VIGOR: A Versatile, Individualized and Generative ORchestrator to Motivate the Movement of the People with Limited Mobility," Smart and Pervasive Healthcare, Editor: Urvashi Sharma, IntechOpen, Jan. 2022.

[2] Y. Liang, D. Wu, et al., "Civil Infrastructure Serviceability Evaluation Based on Big Data," Guide to Big Data Applications, Springer, Editor: S. Srinivasan. Dec. 2016.

[3] W. An, D. Wu, S. Ci, H. Luo, V. Adamchuk, and Z. Xu, "Agriculture Cyber-Physical Systems," Cyber-Physical Systems: Foundations, Principles, and Applications, H. Song, D. Rawat, S. Jeschke, and C. Brecher, Eds. Elsevier Inc., Sept. 2015.

[4] J. Sun, D. Wu, J. Zhang, X. Wang, and S. Ci, "Energy-Aware Mobile Multimedia Computing," Handbook of Energy-Aware and Green Computing, I. Ahmad and S. Ranka, Eds. Chapman & Hall/CRC Press, Jan. 2012

[5]   H. Luo, S. Ci, and D. Wu, "Real-time Multimedia Transmission over Cognitive Radio Networks," Cognitive Radio Mobile Ad Hoc Networks, F. Richard Yu, Ed. Springer, 2011.

Journal Papers

[1]   M. Williams, J. A. Hogg, J. A. Diekfuss, S. B. Kendall, C. T. Jenkins, S. N. Acocello, Y. Liang, D. Wu, G. D. Myer, and G. B. Wilker, "Immersive Real-Time Biofeedback Optimized with Enhanced Expectancies Improves Motor Learning: A Feasibility Study," Journal of Sport Rehabilitation, April 2022.

[2]   C. Sun, V. K. Kumarasamyb, Y. Liang, D. Wu, Y. Wang, "Using a Layered Ensemble of Physics-Guided Graph Attention Networks to Predict COVID-19 Trends," Applied Artificial Intelligence, Mar. 2022.

[3]   D. Wang, J. Tian, H. Zhang, and D. Wu, "Task Offloading and Trajectory Scheduling for UAV-Enabled MEC Networks: An Optimal Transport Theory Perspective," IEEE Wireless Communications Letters, vol. 11, no. 1, Jan. 2022.

[4]   M. Omwenga, D. Wu, Y. Liang, L. Yang, D. Huston, and T. Xia, "Cognitive GPR for Subsurface Object Detection Based on Deep Reinforcement Learning," IEEE Internet of Things Journal, vol. 8, no. 14, July 2021.

[5]   J. Tian, Q. Liu, H. Zhang, and D. Wu, "Multi-Agent Deep Reinforcement Learning Based Resource Allocation for Heterogeneous QoS Guarantees for Vehicular Networks," IEEE Internet of Things Journal, vol. 9, no. 3, Feb. 2022.

[6]   Y. Liang, D. Wu, D. Ledesma, C. Davis, R. Slaughter, and Z. Guo, "Virtual Tai-Chi System: A Smart-Connected Modality for Rehabilitation," Smart Health, July 2018.

[7]   S. Guo, D. Wu}, H. Zhang, and D. Yuan, "Resource Modeling and Scheduling for Mobile Edge Computing: A Service Provider's Perspective," IEEE Access, vol. 6, June 2018.

[8]   N. Lin, S. Ci, D. Wu, and H. Guo, "An Optimization Framework for Dynamically Reconfigurable Battery Systems," IEEE Transactions on Energy Conversion, vol. 33, no. 4, Dec. 2018.

[9]   J. Tian, H. Zhang, D. Wu, and D. Yuan, "QoS-Constrained Medium Access Probability Optimization in Wireless Interference-Limited Networks," IEEE Transactions on Communications, vol. 66, no. 3, Mar. 2018.

[10] S. Mekid, D. Wu, R. Hussain, and K. Youcef-Toumi, "Channel Modeling and Testing of Wireless Transmission for Underground In-Pipe Leak and Material Loss Detection," International Journal of Distributed Sensor Networks, vol. 13 (11), 2017.

[11] D. Wu, Q. Liu, H. Wang, D. Wu, and R. Wang, "Socially Aware Energy Efficient Mobile Edge Collaboration for Video Distribution," IEEE Transactions on Multimedia, vol. 19, no. 10, Oct. 2017.

[12] R. Wang, A. Liang, D. Wu, and D. Wu, "Delay-aware Adaptive Sleep Mechanism for Green Wireless-optical Broadband Access Networks," Optical Fiber Technology, vol. 36, July 2017.

[13] Y. Cao, H. Zhang, D. Wu, and D. Yuan, "OGCMAC: A Novel OFDM based Group Contention MAC for VANET Control Channel," IEEE Transactions on Wireless Communications, vol. 16, no. 9, Sept. 2017.

[14] S. Guo, H. Zhang, P. Zhang, D. Wu, and D. Yuan, "Generalized 3-D Constellation Design for Spatial Modulation," IEEE Transactions on Communications, vol. 65, no. 8, Aug. 2017.

[15] D. Wu, J. Yan, H. Wang, D. Wu, and R. Wang, "Social Attribute Aware Incentive Mechanism for Device-to-Device Video Distribution," IEEE Transactions on Multimedia, vol. 19, no. 8, Aug. 2017.

[16] T. Jiang, H. Wang, M. Daneshmand, and D. Wu, "Cognitive Radio based Smart Grid Traffic Scheduling with Binary Exponential Backoff," IEEE Internet of Things Journal, vol. 4, no. 6, Dec. 2017.

[17] D. Wu, D. Chatzigeorgiou, K. Youcef-Toumi, and R. Mansour, "Node Localization in Robotic Sensor Networks for Pipeline Inspection," IEEE Transactions on Industrial Informatics, vol. 12, no. 2, August 2015.

Conference papers

[1] C. Huang, D. Wu, and Y. Liang, "Adaptive Acquisition of Airborne LiDAR Point Cloud based on Deep Reinforcement Learning," International Conference on Multimedia Information Processing and Retrieval (MIPR), August 2-4, 2022.

[2] Y. Liang, D. Wu, "The Experience with the REU-sponsored Project on Predicting COVID-19 Pandemics Using Physics-Guided Graph Attention Networks," The 13th International Multi-Conference on Complexity, Informatics and Cybernetics (IMCIC), March 8-11, 2022.

[3] Y. Zhi, J. Tian, Q. Liu, H. Zhang, and D. Wu, "Multi-Agent Reinforcement Learning for Cooperative Edge Caching in Heterogeneous Networks," The 13th International Conference on Wireless Communications and Signal Processing (WCSP), October 20-22, 2021.

[4] E. Brock, C. Huang, D. Wu, and Y. Liang, "LiDAR-based Real-time Mapping for Digital Twin Development," IEEE International Conference on Multimedia and Expo (ICME), July 5-9, 2021.

[5] J. Merrill, Y. Liang, and D. Wu, "Extensive Huffman-tree-based Neural Network for the Imbalanced Dataset and Its Application in Accent Recognition," International Conference on Artificial Intelligence in Information and Communication (ICAIIC), April 2021.

[6] S. Clark, E. Brock, D. Wu, and Y. Liang, "Development of Real-time Smart City Mapping Utilizing Game Engines," IEEE International Symposium on Networks, Computers and Communications, Montreal, Canada, October 2020.

[7] M. Omwenga, D. Wu, Y. Liang, D. Huston, and T. Xia, "ScanCloud: Holistic GPR Data Analysis for Adaptive Subsurface Object Detection," IEEE 22nd International Conference on Information Reuse and Integration for Data Science (IRI), August 10-12, 2021.

[8] M. Omwenga, D. Wu, Y. Liang, L. Yang, D. Huston, and T. Xia, "Autonomous Cognitive GPR Based on Edge Computing and Reinforcement Learning," IEEE International Conference on Industrial Internet (ICII), Nov. 2019.

[9] D. Wu, M. Omwenga, Y. Liang, L. Yang, D. Huston, and T. Xia, "Edge Computing Enabled Cognitive Portable Ground Penetrating Radar," The EAI MobiMedia, May 2019.

[10] W. Rice, M. Omwenga, D. Wu, and Y. Liang, "Enhanced Underground Object Detection with Conditional Adversarial Networks," ISSAT International Conference on Data Science and Intelligent Systems, Las Vegas, Nevada, USA, August 1-3, 2019.

[11] D. Wu, M. Omwenga, Y. Liang, L. Yang, D. Huston, and T. Xia, "Fog Computing Enabled Cognitive Ground Penetrating Radars," IEEE ICC, May 2019.

[12] M. Han, Z. Li, J. He, D. Wu, Y. Xie, and A. Baba "A Novel Blockchain-based Education Records Verification Solution," ACM SIGITE, Oct. 2018.

[13] L. Yang, Y. Liang, D. Wu, and J. Gault, "Train and Equip Firefighters with Cognitive Virtual and Augmented Reality," The First IEEE International Workshop on Emerging Cloud, IoT and Social Network Solutions for e-Health and Smart Cities, Oct. 2018.

[14] Y. Liang, D. Wu, D. Ledesma, C. Davis, R. Slaughter, and Z. Guo, "Virtual Tai-Chi System: A Smart-Connected Modality for Rehabilitation," IEEE/ACM CHASE, Sept. 2018.

[15] M. Almaimani, D. Wu, Y. Liang, L. Yang, H. Dryver, and T. Xia, "Classifying GPR Images Using Convolutional Neural Networks," The EAI MobiMedia, June 2018.

[16] H. Suarez, L. Yang, and D. Wu, "Securing GPR Data for Use in Smart Cities," IEEE Fourth International Conference on Big Data Computing Service and Applications, Mar. 2018.

[17] S. Xu, H. Zhang, J. Tian, D. Wu, and D. Yuan, "Pilot Length Optimization for Spectral and Energy Efficient D2D Communications Underlay Massive MIMO Networks," The International Conference on Computing, Networking and Communications (ICNC), Maui, Hawaii, USA, Mar. 2018.

[18] S. Guo, D. Wu, H. Zhang, and D. Yuan, "Queueing Network Model and Average Delay Analysis for Mobile Edge Computing," The Workshop on Computing, Networking and Communications (CNC), Mar. 2018.

Patents

[1] D. Wu, K. Youcef-Toumi, S. Mekid, R. B. Mansour, "Wireless Communication Systems for Underground Pipe Inspection," US20150179044 A1, 06/25/2015.

Selected Professional Activities

- Proposal Review Panelist, National Science Foundation, The Energy, Power, Control, and Networks (EPCN) Program, 03/2022.
- Associate Editor, IEEE Internet of Things Journal, since 02/2020.
- Editorial Board Member, Journal of Green Energy, and Intelligent Transportation, since 05/2022.
- Director of the Communications - Frontiers Board, Multimedia Communications Technical Committee, IEEE Communication Society, 08/2018 - 07/2020.
- Co-Director of the Communications - Frontiers Board, Multimedia Communications Technical Committee, IEEE Communication Society, 08/2016 - 07/2018.
- Associate Editor, IEEE Access, 05/2019 - 05/2022.
- Co-Editor-in-Chief, International Journal of Information Security and Privacy, 04/2016 - 04/2018.
- Associate Editor, Wiley Security and Communication Networks Journal, since 10/2011.
- Editorial Board Member, Journal of Cyber-Physical Systems.
- Guest Editor, IEEE Internet of Things Journal, Special Issue on Internet of Things for Smart and Connected Health, 2015.
- Guest Editor, Wiley's Security & Communications Networks
- Journal, Special Issue on Security and Networking for Cyber-Physical Systems, 2013.
- Guest Editor, International Journal of Ad Hoc and Ubiquitous Computing, Special Issue on Localization and Positioning for Healthcare Applications, 2014-2015.
- Area Chair, IEEE International Conference on Multimedia & Expo (ICME), 2019, 2021
- Web Co-Chair, IEEE International Conference on Multimedia and Expo (ICME) 2019, Shanghai, July 2019
- Program Co-Chair, The 12th EAI International Conference on Mobile Multimedia Communications, Weihai, China, June 2019.
- Panel Co-Chair, The 11th EAI International Conference on Mobile Multimedia Communications, Qingdao, China, June 2018.
- Symposium Co-Chair, IEEE/CIC ICCC 2017, - The sixth IEEE/CIC International Conference on Communications in China, August 2017.
- TPC Co-Chair, The 10th EAI International Conference on Mobile Multimedia Communications, Chongqing, China, July 2017.
- Workshop Co-Chair, The 8th International Conference on Mobile Multimedia Communications, May 2015.
- Track Co-Chair, BODYNETS 2013, - Special Track on Healthcare Applications and Challenges of Body Area Networks, the 8th International Conference on Body Area Networks.
- Symposium Co-Chair, ICNC 2013, - Green Computing Symposium, The 2013 International Conference on Computing, Networking and Communications.

- Member of Technical Program Committee (TPC), IEEE International Conference on Computer Communications (INFOCOM), 2017 - 2019; IEEE International Conference on Communications (ICC), 2012, 2015 - 2022; IEEE International Conference on Multimedia & Expo (ICME), 2012, 2013, 2020; International Conference on Computing, Networking and Communications (ICNC), 2016 - 2018; IEEE Global Communications Conference (GLOBECOM), 2016 - 2021; IEEE Wireless Communications and Networking Conference (WCNC), 2017 - 2018.

Chang S. Phuong

Lecturer, University of Tennessee Chattanooga
615 McCallie Avenue, Chattanooga, TN 37403

3700 Queens Road, Chattanooga, TN 37416
423.298.2244   chang.s.phuong@gmail.com

Career Profile

Lecturer and researcher with 7+ years of academia experience teaching undergraduate and graduate courses and over 20 years of experience in the Information Technology industry. Academia experience includes supervision of faculty; development of academic programs and degrees; working with industry partners; development of courses; and research with publications in peer-reviewed journals and grants. Industry experience at Fortune 500 companies includes development and coaching of technical teams; management of business organizational transformation projects, enterprise strategy roadmaps, and full software development cycle programs ranging from $500K to $5 million in budget; management of teams ranging in size from 5-20 members, in matrix organizations and geographically diverse locations; supported external and internal users across multiple departments; and successfully implemented IT solutions and process improvements.

Education

2022   **Ph.D., Computational Science**
            Concentration: Computer Science
            College of Engineering and Computer Science
            University of Tennessee Chattanooga
            Dissertation title: "Teaching Cybersecurity: A Project-Based Learning and Guided Inquiry
                        Collaborative Learning Approach"
            Dissertation supervisor: Dr. Li Yang

2007   **M.S., Computer Science**
            College of Engineering and Computer Science
            University of Tennessee Chattanooga

2003   **Graduate Certificate, Internet Application Programming**
            College of Engineering and Computer Science
            University of Tennessee Chattanooga

1996   **B.S., Computer Science**
            Concentration: Scientific Application
            Minor: Math
            College of Engineering and Computer Science
            University of Tennessee Chattanooga

Career Highlights

- Developed new and relevant degrees, curriculum, and course content that increased student enrollment by 30% and job placement by 40% in the Computer Information Technology (CIT) Program.
- Created new Industry Advisory Board to connect local businesses with students, College and CIT Program initiatives.
- Taught undergraduate and graduate courses in Computer Science, Cybersecurity, and Project Management.
- Established strategic roadmap to mature Governance and Compliance services to increase work efficiency, reduce cybersecurity risks, and establish operational excellence.

- Designed, developed, and implemented systems that reduced warehousing, printing, and legal costs by $5-6 million annually and improved broker and customer usability experience.
- Transformed Business Continuity and Disaster Recovery (DR) Programs by migrating Mission Critical applications to a lights-out Private Cloud Data Center and reduced DR Exercise duration from 2 weeks to 3-5 days.

Professional Experience

University of Tennessee, Chattanooga, TN   *Jan 2018 – Present*
Lecturer
Instructed undergraduate and graduate level Computer Science (CS) courses that include Cybersecurity, Biometrics, Database Security, Cryptography, Software Engineering, Operating Systems, Programming, Senior Capstone. Actively participate and contribute in scholarly and professional activities at the department, college, and university level.
- Redesigned multiple courses to change modality from face-to-face to synchronous and asynchronous delivery.
- Serve in committees at the department and university level and actively assist with recruitment events.
- Participate and contribute in several NSF research grants.
- Areas of research include Cybersecurity, Pedagogy, Blockchain, and High Performance Computing.

Blue Cross Blue Shield of Tennessee, Chattanooga, TN   **Mar 2017 – Feb 2018**
MANAGER INFORMATION SECURITY GOVERNANCE AND COMPLIANCE, INFORMATION SECURITY SERVICES
Directed coordination and prioritization of Security Governance and Compliance strategic and tactical projects, department budget, and oversight of policies, controls, audits, attestations, risks, vulnerabilities and compliance activities based on NIST-Cybersecurity guidelines. Managed direct reports daily operations, assignment of work, and performance evaluations.
- Used Continuous Improvement techniques to develop strategic roadmap to mature the programs.
- Cultivated an environment to promote trust, transparency and teamwork to improve service delivery and efficiency.
- Built strong partnerships with stakeholders, executives, and subject matter experts to enhance project synergy.
- Selected as a core member for Application Portfolio Manager and Records Management Data Classification enterprise projects. The focus of these projects was to improve workflow efficiencies and minimize security risks.

Chattanooga State Community College, Chattanooga, TN   **Oct 2014 – Mar 2017**
DEPARTMENT HEAD, COMPUTER INFORMATION TECHNOLOGY (CIT)
Worked with CIT faculty to create strategic roadmap, goals, and plans to develop a new CIT Program curriculum to meet community workforce and student needs. Managed CIT faculty, department strategies, and program activities.
- Transformed CIT Program by working with various Chattanooga State departments, the Chamber of Commerce, local businesses, and Tennessee Board of Regents on campus wide and community initiatives.
- Partnered with local businesses to create a new Internship Program and assist with student job placement.
- Supported student's academic success through research grant applications and special projects, implementing tutoring programs, bringing expert speakers and community leaders to campus, and encouraging student participation at technical professional organizations, hackathons, technical workshops and conferences.
- Established strong intercollegiate relationships and developed curriculum synergy for academic degree transfers.

University of Tennessee, Chattanooga, TN   **Jan 2016 – May 2016**
ADJUNCT INSTRUCTOR, COMPUTER SCIENCE DEPARTMENT
Taught Fundamentals of Computer Science class to undergraduate students with an emphasis on Java
programming, variables, if-else conditions, loops, arrays, and classes and objects.

Chattanooga State Community College, Chattanooga, TN   **Aug 2015 – Dec 2015**
SPANISH INSTRUCTOR, CONTINUING EDUCATION
Taught an introduction to conversational Spanish to Erlanger Hospital employees with a focus on developing basic
conversational skills used to communicate in a hospital and healthcare setting.

Unum Group, Chattanooga, TN   **Mar 2000 – Oct 2014**
SYSTEMS CONSULTANT II – DISASTER RECOVERY (DR) TEAM   OCT 2010 TO OCT 2014
Managed DR Team in transformation and development of a new comprehensive enterprise DR Program.   Provided
oversight of DR projects to comply with government regulations and company policies. Monitored progress,
reported on violations, and recommended process improvements to reduce potential security and business
continuity risks.
- Managed transition of Mission Critical applications to new Data Center for Private Cloud IaaS/SaaS and
  identified infrastructure, network, software and database support needs to maintain optimal Production
  performance.
- Worked closely with senior executives in Global Services to assess maturity level of DR Program and
  developed a short and long term DR strategic road map for Unum US/UK and Colonial Life based on ITIL
  and BCI principles.
- Partnered with business units to develop new enterprise programs, security standards, and governance
  procedures.
- Reduced DR Exercise planning and execution duration by 70% through Continuous Improvement
  techniques.

PACESETTER – CONTINUOUS IMPROVEMENT, PROGRAM OFFICE   SEP 2008 TO OCT 2010
Executed projects that followed Lean Six Sigma (DMAIC) and Project Management guidelines and used tools such
as Root Cause Analysis and Process Mapping to identify waste.
- Worked with senior executives on strategic and tactical projects to develop standards and workflow
  efficiencies.
- Produced savings of over $500,000 and improved customer experience and claims management.

SYSTEMS CONSULTANT II – INFORMATION TECHNOLOGY RISK AND ASSET MANAGEMENT   MAR 2000 TO SEP
2008
Successfully managed, mentored, and led team of developers in their daily workload, project assignments and use
of technology. Managed projects and risk assessment for multiyear/multimillion-dollar projects and reduced
billing, warehousing, marketing, operating, fraud prevention, and litigation costs and fines by millions of dollars per
year.
- Partnered closely with VPs to define strategic and tactical plans. Supported the Law Department, Internal
  Audit and Compliance, Internal Controls (Sarbanes-Oxley), Records Management, Business Continuity,
  Internet Enrollment, and Corporate Marketing across the enterprise in the US and UK offices.
- Managed vendors, contracts, pricing, and maintenance negotiations to minimize expenses.
- Received multiple job promotions based on overall performance.
- PROMOTION PROGRESSION:
  AUG 2004 – SEPT 2008   SYSTEMS CONSULTANT II, INFORMATION TECHNOLOGY RISK AND ASSET MANAGEMENT
  APR 2002 – AUG 2004   SYSTEMS CONSULTANT I, CORPORATE APPLICATIONS
  OCT 2000 – APR 2002   SYSTEMS ANALYST, CORPORATE APPLICATIONS
  MAR 2000 – OCT 2000   PROGRAMMER ANALYST III, ENROLLMENT AND MARKETING SYSTEMS

Cigna HealthCare, Chattanooga, TN   **Oct 1997 – Mar 2000**
Business Analyst Programmer – Information Management and Technologies
Worked as a member of an automation team with emphasis on Intel based platform applications and eCommerce.

- Responsible for the proposal and development of the Benefit Quick Reference web application whose user base grew from 100 to over 1,000 in 12 offices in a period of 6 months.
- Worked on the design, development, rewrite and support of multiple systems from an OS/2 PC/web environment to Windows PC/web environment.
- Designed, developed and maintained a Socket Application to execute CICS transactions from a PC environment.
- Developed and maintained applications for CICS transactions, mainframe extracts and EDI subsystems.

Healthsource Provident, Chattanooga, TN   **Aug 1996 – Oct 1997**
Microsoftware Technician – Health Data Analysis
Responsible for the management, security, backup recovery and maintenance of an OS/2 LAN with over sixty (60) users and twelve (12) printers.
- Analyzed and streamlined the users' workflow and improved productivity by standardizing desktop applications and printer assignments.
- Assisted in the development of the HTML code and graphics for the HEDIS web site.
- Provided core support on DOS and Windows applications and PC/LAN training to the users.
- Used Microsoft Access to develop a relational database to track hardware inventory, user information, and network settings.

Tennessee Valley Authority, Chattanooga, TN   **June 1995 – Aug 1996**
Systems Integrator – Technology Advancements
Provided technical support for over ninety (90) desktop computers and seventy-five (75) users.
- Developed a program to recover unused IP addresses in the Local Area Network.
- Responsible for systems integration, purchasing, maintenance, and troubleshooting of hardware and software.
- Developed and implemented a Microsoft Access relational database to keep track of hardware inventory and network information.

Peer-Reviewed Publications
- **Phuong, C., Lyons, T. (2021, November).** A Project-based Experiential Learning Approach to Cybersecurity and Biometrics. Simonson, Michael, and Deborah Seepersaud. "Annual Proceedings of Selected Papers on the Practice of Educational Communications and Technology Presented Online and On-Site during the Annual Convention of the Association for Educational Communications and Technology (44th, Chicago, Illinois, 2021). Volume 2." Association for Educational Communications and Technology (2021).
- **Phuong, C., Saied, N., & Tanis, C. (2019, September).** Assessing Kokkos Performance on Selected Architectures. In Latin American High Performance Computing Conference (pp. 170-184). Springer, Cham.
- **Yang, L., Phuong, C., Novobilski, A., & Ege, R. K. (2008).** Trust-Based usage Control in Collaborative environment. International Journal of Information Security and Privacy (IJISP), 2(2), 31-45.

Awards and Honors
2012   Certificate of Recognition – Amigos Newsletter, Unum Group, Chattanooga, TN.
2007   **Inducted into Upsilon Pi Epsilon, International Honor Society for the Computing and Information Disciplines.**
2007   Certificate of Appreciation – Unum Domain Collapse User Migration, Unum Group, Chattanooga, TN.
2006   Unum Dependability Award – IT Risk and Asset Management, Unum Group, Chattanooga, TN.
2005   Unum Performance Edge Team Award – IT Risk and Asset Management, Unum Group, Chattanooga, TN.
2004   **Certificate of Appreciation – Unum Canada Transition Rebranding Initiative, Unum Group, Chattanooga, TN.**

Conferences
Invited talks
- **2022 Accounting & Financial Women's Alliance (AFWA)** – Demystifying Ransomware Attacks.
- **2021 Association for Education Communications & Technology (AECT) International Convention** – A Project-based Experiential Learning Approach to Cybersecurity and Biometrics.
- **2019 Association for Education Communications & Technology (AECT) International Convention –** The Impact of Guided Inquiry Collaborative Learning on Student Learning in Secure Coding (Poster).
- **2019 Latin America High Performance Computing Conference (CARLA) –** Assessing Kokkos Performance on Selected Architectures.
- **2019 Prairie View A&M University Privacy Workshop –** IoT Security and Privacy.
- **2018 Chattanooga Blockchain Meetup –** Hyperledger PoET.

Campus talks
- **2022 Asian American Pacific Islander (AAPI) Heritage Month, Asian Student Association (ASA), University of Tennessee Chattanooga** – Asian Professionals in America.
- **2021 Annual Instructional Excellence Conference, Walker Center for Teaching and Learning, University of Tennessee Chattanooga** – Adding the Power of Making to your Class.
- **2021 Technology Symposium, College of Engineering and Computer Science, University of Tennessee Chattanooga –** A Maker Learning Approach to Cybersecurity.
- **2019 Research Dialogues, University of Tennessee Chattanooga –** Performance Portability: A comparison between OpenMP, CUDA, and Kokkos.
- **2019 GenCyber Teachers Camp, University of Tennessee Chattanooga –** The 10 First Principles of Cybersecurity.

Conference and Workshop participation
- **2022 Association for Education Communications & Technology (AECT) International Convention,** Las Vegas, Nevada.
- **2019 DragonJAR Security Conference**, Universidad de Manizales, Colombia.
- **2019 Petascale Institute**, University of Tennessee Chattanooga.
- **2019 National Cyber Summit**, Huntsville, Alabama.
- **2016 SANS Fire** Washington D.C.
- **2016 Faculty Development Workshop on Information Assurance and Security (PLAB)**, Kennesaw State University, Georgia.

Research Experience
2021 – 2022   **National Security Agency (NSA)**
Cybersecurity Education Diversity Initiative (CEDI)
Instructor and contributor

Summer 2021   **GenCyber**
Student Summer Camp
Lead Instructor and contributor

Summer 2019   **GenCyber**
Teacher Summer Camp
Instructor and contributor

2018 – 2021   **National Science Foundation (NSF)**
Collaborative Research: Enhancing Cybersecurity Education Using Process Oriented Guided Inquiry Learning (POGIL) (CRESEUP)
Contributor

Certifications
2017   CEB Leadership Academy
2017   Crucial Conversations
2013   Certified Data Center Professional (CDCP)
2013   Certified Business Resiliency Information Technology Professional (CBRITP)
2011   Information Technology Infrastructure Library (ITIL) v3 Foundation Certified
2010   Lean Six Sigma Black Belt
2008   Project Management Professional (PMP)

Volunteer/Service
2021 – Present   Faculty Senate Non-Tenure Track
2010 – Present   Interpreter for schools and health fair events for inner city Hispanic families, La Paz
2003 – Present   Chattanooga-Hamilton County Health Department Emergency Preparedness
Nov 2022   BAS-ITCys Program promotional video
Fall 2022   Congressional App Challenge - Judge
2021 – 2022   Computer Engineering ABET Accreditation Committee, University of Tennessee Chattanooga
2021 – 2022   By-Law Committee, Computer Science Department, University of Tennessee Chattanooga
2020 – 2021   Undergraduate Curriculum Committee, University of Tennessee Chattanooga
2020 – 2021   Computer Engineering ABET Accreditation Committee, University of Tennessee Chattanooga
Oct 2021   Project Management Institute (PMI) Virtual Experience Series
Jun 2021   Project Management Institute (PMI) PMXPO
Mar 2021   Marketing Video – Computer Science Department
Nov 2020   Outreach – College of Engineering and Computer Science Panel Discussion
Summer 2020   COVID-19 Bilingual Contact Tracer, Health Department Hamilton County, TN
Mar 2020   Judge, Chattanooga Science & Engineering Fair
2019 – 2020   BlueSky Curriculum Committee, University of Tennessee Chattanooga
2017 – 2019   Industry Advisory Board, Business Division, Chattanooga State Community College
2015 – 2017   VP of Communications, Project Management Institute (PMI) Chattanooga Chapter
2016 – 2017   Polytech Academy Computer Information Technology, Program Designer, Chattanooga State/HCDE
2015 – 2016   TechHire Taskforce, Program Lead, Chattanooga Chamber of Commerce
2014 – 2015   Chattanooga Arts Build – Cultural Diversity Task Force
Dec 2014   First LEGO League Competition – Design Judge
Apr 2014   Chattanooga Area Food Bank
2011 – 2014   Production Director, Unum's Hispanic of Initiative, Amigos Newsletter
Spring 2011   Math Tutor, Junior Achievement
2008 – 2010   Director of Web Communications, Project Management Institute (PMI) Chattanooga Chapter
Fall 2009   Math Tutor, Junior Achievement
2007, 2008   ChoicePoint Customer Advisory Member
2001 – 2006   Advisory Board Member, Chattanooga Tai Ji Community

Affiliations
2021 – Present   Adaptive Tai Ji
2006 – Present   Project Management Institute
1999 – Present   Chattanooga Tai Ji Community
1991 – Present   Pak Mei Chinese Boxing Association
1986 – Present   Chattanooga Chinese Association
2019 – Present   Association for Education Communications & Technology
2013 – 2014   Business Continuity Institute

Joseph M. Kizza
<u>**EDUCATION**</u>
Ph.D.   1990   Computer Science, The University of Nebraska, Lincoln, NE
M.A.   1986   Mathematics, The University of Toledo, Toledo, OH
M.S.   1980   Engineering (Computer Science), California State University, Sacramento, CA
B.S.   1975   Math-Computer Science, Makerere University, Uganda

<u>**PROFESSIONAL EXPERIENCE**</u>

2022-Present   Professor and Head, Department of Computer Science and Engineering, University of Tennessee at Chattanooga, Chattanooga, TN
2020- 2022   Professor, Department of Computer Science and Engineering, University of Tennessee at Chattanooga, Chattanooga, TN
2019-2020   Professor and Head, Department of Computer Science and Engineering, University of Tennessee at Chattanooga, Chattanooga, TN
2018-2019   Professor and Associate Dean, College of Engineering and Computer Science University of Tennessee at Chattanooga, Chattanooga, TN
2009 – 2018   Professor and Head, Department of Computer Science and Engineering, University of Tennessee at Chattanooga, Chattanooga, TN
2002 – 2009   Professor, University of Tennessee at Chattanooga, Chattanooga, TN

<u>**AWARDS:**</u>
2018 –Lifetime Achievement Award, The University of Tennessee-Chattanooga
2007 *CHOICE* OUTSTANDING ACADEMIC TITLE: *Computer Network Security and Cyber*
Ethics, *2d ed.*, McFarland Publishers, 2006. 223pp. softcover ISBN 978-0-7864-2595-2
Best Engineering and Computer Science Researcher, UTC, 2006.
Outstanding Computer Science Teaching Award, UTC, 2005.
Outstanding Scholarly Contribution Award - from the International Institute for Advanced Studies in Systems Research and Cybernetics (IIAS). The award is given for outstanding scholarly research and educational work and for providing an exemplary contribution to the integration of engineering and social issues- 2004.
Senior Fulbright Scholar Award to Indonesia, 2006**.**
Fulbright Scholar 2003-2004 to Uganda at Mbarara University of Science and Technology**.**
2002 *Choice* "Outstanding Academic Title" award for *Computer Network Security and CyberEthics*<u>.</u>
McFarland Publishers, Inc., Jefferson City, NC, and London, UK, 2002.

<u>**INTERNATIONAL SERVICE**</u>
Academic Advisor ICT for Development (ICT4D), Nairobi, Kenya, an IDRC funded research network – 2010.
Research Advisor to Local Governance and ICTs Research Network for Africa (LOG-IN Africa), an IDRC funded research network covering 9 African countries.
Informatics Expert for the United Nations Scientific and Cultural Organization (UNESCO), 1994 - present
Editor –in-Chief for the <u>International Journal of Computing and ICT Research</u> (IJCIR)
Member Editorial Board:
<u>International Journal of Emerging Mechanical Engineering Technology</u>
<u>African Journal of Science, Technology, Innovation, and Development.</u>
<u>International Cyber crimes Journal Society of Productivity</u> <u>Enhancements</u> (ISPE)
<u>International Journal of Information Science (IJIS)</u>
<u>The International Journal of Cyber Ethics in Education (IJCEE)</u>.
<u>The African Journal of Information and Communication</u>

Keynote: "Using Subgrapg Isomorphism as a Zero Knowledge Proof Authenntication in Timed Wireless Mobile Networks", at the 6th Annual International Conference on Computing and ICT Research, - SREC2010
Keynote: "(Inter)net Neutrality: Your Voice Matters", at the 5th Annual International Conference on Computing and ICT Research, - SREC2009
Keynote: "Implementing Security in Sensor Networks", at the 4th Annual International Conference on Computing and ICT Research, - SREC2008
Keynote: "The Diminishing Private Network Security Perimeter Defense", at the 3rd Annual International Conference on Computing and ICT Research, - SREC2007.
"Technology and Academic Dishonesty", University of Torku –Finland (IFIP), June 26-28, 2005.

PROFESSIONAL PUBLICATIONS
BOOKS (J. M. Kizza)
Guide to Computer Network Security – 5th Edition Springer - Hardcover
Guide to Computer Network Security– 4th Edition - Ebook Edition
Ethics and Secure Computing: A Module, Springer, 2018 – Hardcover.
Guide to Computer Network Security – 4th Edition Springer - Hardcover
Guide to Computer Network Security– 4th Edition - Ebook Edition
Guide to Computer Network Security – 3rd Edition Springer - Persian
Ethics in Computing: A Module, Springer, 2016 – Hardcover.
Ethics in Computing: Module, Springer, 2016. E-Edition.
Guide to Computer Network Security – 3rd Edition Springer - Hardcover,
Guide to Computer Network Security– 3rd Edition - Ebook Edition
Computer Network Security and Cyber Ethics – 4th Edition - Hardcover,
Computer Network Security and Cyber Ethics – 4th Edition - Ebook Edition
Guide to Computer Network Security – 2nd Edition – Hardcover,
Guide to Computer Network Security – 1st Edition – Chinese.
Social and Ethical Issues in the Information Age – 6th Edition - Hardcover,
Social and Ethical Issues in the Information Age – 6th Edition - Archived Edition

Yu (Hugh) LIANG,
B.Eng (CS), M.Eng (CS), Ph.D (CS), Ph.D (Appl. Math).
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EDUCATION

- Ph.D. / Appl. Math (8/98-7/01, 09/05), Univ. of Ulster (UK), directed by J. Weston, M. Szularz and D. Bustard. Thesis: *The Use of Parallel Polynomial Preconditioner in the Solution of Systems of Linear Equations*.
- Ph.D. / Computer Science (9/95-7/98, 07/98), Chinese Academy of Sciences, directed by C. D. Han. Thesis: *Timing-sequence based Test of Parallel Program*.
- M.Eng / Computer Science (9/92-2/95, 02/95), Beijing University of Technology, directed by Y.W. Liang. Thesis: *Accelerate the Test-generation of the combinational circuit by taking advantages of the associated structural laws*.
- B.Eng / Computer Science and Technology (9/85-7/90, 07/90), Tsinghua University, directed by G.Z. Zhang. Thesis: *Design and Research on Network Interface*.

RESEARCH INTERESTS

Numerical linear algebra; modeling and simulation; data analytics; computational mechanics; parallel and distributed computing; big-data and cloud computing; sensor-oriented information processing and analysis; hyper-spectral image and video processing; fault-tolerance technique.

ACCOMPLISHMENTS

- One book and four book chapters in computational and computer science
- About one hundred published peer-reviewed journal papers and conference proceeding papers
- Editorial board member of several peer-reviewed journals
- Technical committee member and division chair of many international conferences
- Panelist of multiple NSV projects
- More than 50 government (NSF, DOE, DOT, U.S. Air-Force, U.S. NAVY, U.S. ARMY) and industry sponsored research projects
- Taught about twenty undergraduate- and graduate-level computer and mathematics courses

PROFESSIONAL EXPERIENCE

- Professor / Computer Science (08/20 – present), Department of Computer Science and Engineering, University of Tennessee at Chattanooga.
- Associate Professor / Computer Science (08/13 – 08/20, tenured in 2016), Department of Computer Science and Engineering, University of Tennessee at Chattanooga.
- Associate Professor /Computer Science (04/13-08/13), Department of Mathematics and Computer Science, Central State University.
- Summer Faculty Fellow (05/2012-08/2012), Sensors Directorate, U.S. Air Force Office of Scientific Research.
- Summer Faculty Fellow (05/2011-08/2011), Sensors Directorate, U.S. Air Force Office of Scientific Research.
- Assistant Professor /Computer Science (08/07-04/13, tenured in August 2012), Department of Mathematics and Computer Science, Central State University.

RESEARCH GRANT

- "*DOE-EERE: Collaborative Research: Developing an Energy-Conscious Traffic Signal Control System for Optimized Fuel Consumption in Connected Vehicle Environments*", U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy (DOE-EERE), Co-PI, $1,876,469, 10/01/2020 - 12/31/2023.
- "*HDR DSC: Collaborative Research: ADACE: Anthropocentric Data Analytics for Community Enrichment.*" National Science Foundation: Harnessing the Data Revolution (HDR): Data Science Corps (DSC) (#1924278), PI, UTC (leading institute), $723,644, 10/01/2019-09/31/2022.

- "*A Framework for Quantitative Assessment of the Environment, Social, and Economic Benefits of TDOT Infrastructure*", Tennessee Department of Transportation (TDOT), Co-PI, $200,000, 01/01/2020-12/31/2022.
- "REU Site: ICompBio - Engaging Undergraduates in Interdisciplinary Computing for Biological Research", National Science Foundation: CNS - Smart & Connected Community: Biological Big Data Spokes, Co-PI, National Science Foundation (#1761839), UTC, $433,8670, 09/01/2018-08/31, /2022.

BOOK OR BOOK CHAPTERS
- Y. Liang, Dalei Wu, Dakila Ledesma, Zibin Guo, Erkan Kaplanoglu and Anthony Skjellum (April 7th, 2021). "VIGOR: A Versatile, Individualized and Generative ORchestrator to Motivate the Movement of the People with Limited Mobility", Smart and Pervasive Healthcare. DOI: 10.5772/intechopen.96025. Available from: https://www.intechopen.com/online-first/vigor-a-versatile-individualized-and-generative-orchestrator-to-motivate-the-movement-of-the-people-, April 2021.
- Y. Liang, D. Wu, D. Huston, G. R. Liu, Y. Li, CL. Gao, J. Ma, *Chapter 12: Civil Infrastructure Serviceability Evaluation Based on Big Data*, in "Guide to Big Data Application." Edited by S. Srinivasan. Springer Publishing. ISBN-13: 9783319538167, June 7th, 2018.

PATTERNS
- Zibin Guo, Y. Liang, D. Wu, N. Fell, and A. Clark, "Virtual TaiJi System - An Innovative Modality for Rehabilitation", an invention disclosure has been submitted to University of Tennessee Research Foundation (UTRF, http://urtf.utc.edu) and received the UTRF file number designated above, 16051-02.

REPRESENTATIVE JOURNAL PAPERS
- M. Omwenga, D. Wu, Y. Liang Y, D. Houston, T. Xia T, and L. Yang, "Cognitive GPR for Subsurface Object Detection Based on Deep Reinforcement Learning." IEEE Internet of Things Journal (Impact factor: 9.396). DOI: 10.1109/JIOT.2021.3059281.
- Y. Liang and D. Wu, "Transforming Data Science Education through a Portable and Sustainable Anthropocentric Data Analytics for Community Enrichment Program (ADACE)", Journal of Computers in Education (Invited).
- Y. Liang and R. Haney, "A Polynomial-based Hessian-Free-Newton-Raphson Optimizer for the Training of Neural Network", Neurocomputing (Impact Factor: 3.171) (2nd round review).
- D. Ledesma, Y. Liang and W. Wu, "Adaptive Generation of Phantom Limbs Using Visible Hierarchical Autoencoders", arXiv:1910.01191 [cs.HC].
- Y. Liang, D. Wu, Z. Guo, C. Davis, D. Ledesma, R. Slaughter, "Virtual Tai-Chi, System, a Smart Connected Modality for Rehabilitation", Smart Health, Volumes 9-10, December 2018, pages 232-249, DOI: 10.1016/j.smhl.2018.07.021.

SELECTED CONFERENCE PAPERS AND PRESENTATION
- J. Merrill, Y. Liang and D. Wu, "Extensive Huffman-tree-based Neural Network for the Imbalanced Dataset and Its Application in Accent Recognition," 2021 International Conference on Artificial Intelligence in Information and Communication (ICAIIC), 2021, pp. 310-315, doi: 10.1109/ICAIIC51459.2021.9415243. (acceptance rate: 26%)
- E. Brock, J. Chuang, D. Wu, and Y. Liang, "LIDAR-based Real-time Mapping for Digital Twin Development", IEEE ICME 2021 (https://2021.ieeeicme.org/), Shenzhen, China, July 5-9, 2021 (acceptance rate: 26%).
- Y. Liang and R. Haney, "A Polynomial-based Hessian-Free-Newton-Raphson Optimizer for the Training of Neural Network", 2020 International Conference on Soft Computing & Machine Learning (SCML2020), Oct 16th-19th, Online Conference, http://www.icscml.org/VideoPresentation.html
- T. Clark, E. Brock, D. Wu and Y. Liang, "Development of Real-Time Smart City Mapping Utilizing Game Engines," *2020 International Symposium on Networks, Computers and*

Communications (ISNCC), Montreal, QC, Canada, 2020, pp. 1-6, doi: 10.1109/ISNCC49221.2020.9297248.

ACADEMIC MEMBERSHIP
- SPIE, Sigma-Xi

RECENT PROFESSIONAL ACTIVITIES
- Panel of NSF: OAC-Career, October 16-17, 2019.
- Program Committee Member, IEEE BIGDATA SERVICE 2019, San Francisco East Bay, California, USA, April 4-9, 2019.
- Program Committee Member, IEEE Big Data Congress 2019, Millan Italy, July 8-13, 2019.
- Panel of NSF:Smart Connected Communities (SCC), July 2018.
- Program Committee Member, IEEE Big Data Service 2018, March 26-29, Bamberg, Germany.
- Program Committee Member, The 2017 IEEE International Conference on Smart City Innovations (August 4-8, 2017, San Francisco, USA, http://ieee-smartworld.org/2017/sci/).

INDUSTRIAL EMPLOYMENT EXPERIENCE
- Technique Director (part time), Beijing Long-Mark Computer Co., 7/1991-8/1995
- System Engineer (full time), Beijing Wire Communication Co., 8/1990-8/1992

HONORS
- College Faculty Leadership Award, Central State University, 2012.
- U.S. Air Force Summer Faculty Fellowship Program, 2012
- U.S. Air Force Summer Faculty Fellowship Program, 2011.
- Vice-Chancellor Scholarship of University of Ulster, 1998-2001.
- Oversea Research Scholarship of United Kingdom, 1998-2001.

MENGJUN XIE

EDUCATION
- B.Eng. in Computer Science, East China Normal University (Shanghai, China)   1999
- M.Eng. in Computer Science, East China Normal University (Shanghai, China)   2002
- Ph.D. in Computer Science, College of William and Mary (Virginia, USA)   2010

ACADEMIC EXPERIENCE
- University of Tennessee at Chattanooga, Associate Professor, 2018-Present, Full Time
- University of Arkansas at Little Rock, Associate Professor, 2016-2018, Full Time
- University of Arkansas at Little Rock, Assistant Professor, 2010-2016, Full Time

NON-ACADEMIC EXPERIENCE

CERTIFICATIONS OR PROFESSIONAL REGISTRATIONS

CURRENT MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS
- Lifetime Member, Association for Computing Machinery (ACM)
- Member, ACM Special Interest Group on Security, Audit and Control (SIGSAC)
- Member, ACM Special Interest Group on Mobility of Systems, Users, Data, and Computing (SIGMOBILE)
- Member, ACM Special Interest Group on Computer Science Education (SIGCSE)
- Member, ACM Special Interest Group on Information Technology Education (SIGITE)
- Member, Institute of Electrical and Electronic Engineers (IEEE)
- Member, The Advanced Computing Systems Association (USENIX)

HONORS AND AWARDS
- 2015 NIH mHealth Summer Training Institute (mHTI) Scholarship
- 2016 Best Poster Award of IEEE Conference on Communications and Network Security
- 2017 Faculty Excellence Award in Research and Creative Endeavors, EIT College, University of Arkansas at Little Rock

SERVICE ACTIVITIES
- Member of UTC Faculty Senate, 2020-Present.
- Member of UTC CECS Technology Symposium Planning Committee, 2019-Present.
- Member of CSE Department Hiring Committee, 2021-Present.
- TPC Member of 2021 IEEE International Conference on Distributed Computing Systems
- TPC Member of 2021 ACM Technical Symposium on Computer Science Education
- TPC Member of 2021 IEEE International Conference on Communications (ICC)

PUBLICATIONS AND PRESENTATIONS
- Chen Xu, Ruipeng Zhang, Mengjun Xie, and Li Yang, "Network Intrusion Detection Systemas a Service in OpenStack Cloud," in *Proceedings of 2020 IEEE International Conference on Computing, Networking and Communications (ICNC'20)*, pp. 450-455, Big Island, Hawaii, USA, 2020.

- Ruipeng Zhang, Mengjun Xie, and Li Yang, "Isoflat: Flat Provider Network Multiplexing and Firewalling in OpenStack Cloud," in *Proceedings of 2019 IEEE International Conference on Communications (ICC'19)*, 7 pages, Shanghai, China, 2019.
- Jing Zhang and Mengjun Xie, "New Resources for Undergraduate Power Systems Laboratory," in *Proceedings of 2018 ASEE Midwest Section Conference*, 9 pages, Kansas City, MO, USA, 2018.
- Yanyan Li, Dung Nguyen, and Mengjun Xie, "EZSetup: A Novel Tool for Cybersecurity Practices Utilizing Cloud Resources," in *Proceedings of the 18th ACM Annual Conference on Information Technology Education (SIGITE'17)*, pp. 53-58, Rochester, NY, USA, 2017.
- Yanyan Li, Mengjun Xie, and Jiang Bian, "SegAuth: A Segment-based Approach to Behavioral Biometric Authentication," in *Proceedings of 2016 IEEE Conference on Communications and Network Security (CNS'16)*, pp. 15-23, Philadelphia, PA, USA, 2016.
- Yanyan Li and Mengjun Xie, "Platoon: A Virtual Platform for Team-oriented Cybersecurity Training and Exercises," in *Proceedings of the 17th ACM Annual Conference on Information Technology Education (SIGITE'16)*, pp. 20-25, Boston, MA, USA, 2016.
- Jiang Bian, Yi Guo, Mengjun Xie, Alice Parish, Isaac Wardlaw, Rita Brown, François Modave, Dong Zheng, and Tamara Perry, "Exploring the association between self-reported asthma impact and Fitbit-derived sleep quality and physical activity measures in adolescents," in *JMIR mHealth and uHealth*, volume 5, number 7, pp. e105, doi:10.2196/mhealth.7346, PMID: 28743679, 2017.
- Yue Zhao, Kenji Yoshigoe, Jiang Bian, Mengjun Xie, Zhe Xue, and Yong Feng, "A Distributed Graph-Parallel Computing System with Lightweight Communication Overhead," in *IEEE Transactions on Big Data*, volume 2, issue 3, pp. 204-218, 2016.

PROFESSIONAL DEVELOPMENT ACTIVITIES
- NSF Training Workshop: CSinParallel Summer 2020 Virtual Workshop (2.5 days), Online, 2020
- NSF Training Workshop: Developing Empirical Education Research Studies in CS (4 days), Online, 2020
- NSA Faculty Professional Development Workshop: SCADA/ICS Security (2 days), Las Vegas, NV, 2019

<div align="center">**VITA AND PUBLICATION**</div>
<div align="center">**Li Yang, Ph.D.**</div>

Email: liyang@nsf.gov; Li-Yang@utc.edu

Highlights

- Program Director (AD-4) at National Science Foundation, received NSF Director Superior Awards twice
- Served as Assistant Dean in College of Engineering and Computer Science at UT Chattanooga
- Rich administration experiences in graduate program in Computer Science at UT C Chattanooga
- Secured over 4 million grants from agencies including National Science Foundation (NSF), Department of Defense (DoD), and National Institute of Health (NIH)
- Direct A National Center of Academic Excellence – Cyber Defense Education (CDE) since 2011
- Rich accreditation experiences in ABET, SACS, and THEC in Computer Science programs
- Built programs from B.S. to M.S. and Ph.D. concentrations/programs in areas of cyber security and data science
- Editor-in Chief for an International Journal of Information Security and Privacy 2014-2018

Education

Ph.D.	2005	Computer Science, Florida International University, Miami, FL
M.S.	2003	Computer Science, Florida International University, Miami, FL
M.A.	2000	Finance, Jilin University, Jilin, P. R. China
M.A.	1997	Finance, Jilin University, Jilin, P. R. China
Minor	1996	Computer Science, Jilin University, Jilin, P. R. China

Work Experiences:

2019.08-Present   Program Director (AD4), Division of Graduate Education, National Science Foundation.

2017.08-Present   Guerry Professor, Department of Computer Science and Engineering, University of Tennessee at Chattanooga, Chattanooga, TN

2011.11-Present   Director of UTC InfoSec Center, A National Center of Academic Excellence – Information Assurance/Cyber Defense (IA/CD), University of Tennessee at Chattanooga, Chattanooga, TN

2016.07-2018.07   Assistant Dean, College of Engineering and Computer Science, University of Tennessee at Chattanooga, Chattanooga, TN

2014.08-Present   Professor, Department of Computer Science and Engineering, University of Tennessee at Chattanooga, Chattanooga, TN

2008.08-2016.07   Coordinator of graduate program, Department of Computer Science and Engineering, University of Tennessee at Chattanooga, Chattanooga, TN

2009 – 2014	Associate Professor, Department of Computer Science and Engineering, University of Tennessee at Chattanooga, Chattanooga, TN
2005 – 2009	Assistant Professor, Department of Computer Science and Engineering, University of Tennessee at Chattanooga, Chattanooga, TN
2001 – 2005	Teaching Assistant, Research Assistant, School of Computer Science, Florida International University

Awards and Honors

2022	NSF Director's Award Superior Accomplishment (individual) for Inspired Leadership and Problem Solving in new standards to govern the management of NSF's CyberCorps® Scholarship for Service, including the establishment of an interagency working group to reduce burden in administering this scholarship.
2021	NSF Director's Award Superior Accomplishment in National Spectrum Collaboration Group. For outstanding accomplishment and strategic collaboration in implementing and promoting research and utilization of national spectrum resources.
2021	IEEE Big Data Security Leadership Award, For leadership in Big Data Security Privacy by giving keynote addresses, motivating the researchers and promoting the field of Big Data Security and Privacy. Award – IEEE Bigdata security 2021
2019	Council of Scholars (CoS) for faculty members who have distinguished themselves through scholarly activities and creative achievements.
2019	Service award, Department of Computer Science and Engineering, University of Tennessee at Chattanooga, April 2019.
2018	Alpha Society, one of the oldest and most prestigious honor societies at UTC
2017	Outstanding Faculty Research and Creative Achievement, University of Tennessee at Chattanooga (UTC)
2017	Outstanding Researcher, College of Engineering and Computer Science, University of Tennessee at Chattanooga (UTC)
2015	Best Advisor in the College of Engineering and Computer Science and Department of Computer Science and Engineering, UTC, TN
2007, 2010, 2011, 2012	Research Award in the College of Engineering and Computer Science, UTC, Chattanooga, TN
2007, 2010, 2011, 2012, 2013	Research Award in the Department of Computer Science and Engineering, UTC, Chattanooga, TN

2006 to 2015
    Exceptional Merit (exceeds expectation), UTC, Chattanooga, TN
2004 – 2005
    Excellent PhD. student awards in School of Computer Science, FIU, Miami, FL

Program Director (AD-4)   National Science Foundation, Alexandria, VA
                              08/2019– present

- Program Director for the CyberCorps® Scholarship for Service (SFS) program. This program was authorized by National Defense Authorization Act 2014 to increase the number of qualified and diverse cybersecurity candidates for federal cybersecurity positions through awarding quality programs and improve the capacity of universities to produce high-quality cybersecurity graduates.
- Program Director for the Secure and Trustworthy Cyberspace (SaTC) program, a program cross multiple directorates of NSF.
- The position also includes participation in many other initiatives where
- cybersecurity, education, and workforce development intersect, including National AI Research Institute, Future of the Work-Human Technology Frontier (FW-HTF), the Training-based Workforce Development for Advanced Cyberinfrastructure (CyberTraining), Faculty Early Career Development Program (CAREER), Research Experiences for Undergraduates and interaction with many other federal agencies and participation on many trans-federal workgroups. My role also includes serving on the National Information Technology Research and Development's (NITRD) Information Integrity working group and National Institute of Standards and Technology (NIST) Interagency Coordination Council (ICC).

Activities include:

- Coordinate the $75M CyberCorps® SFS program (FY2023).
- Manage the day-to-day functioning of the program with staff from three NSF Directorates (EHR, CISE, SBE, OAC), the Office of Personnel Management (OPM), the Department of Homeland Security (DHS), and the Department of Education.
- Initiate action to enhance CyberCorps® and SaTC portfolio with Artificial Intelligence by publishing Dear Colleague Letter: Cybersecurity Education in the Age of Artificial Intelligence to promote innovation and collaboration among researchers from Artificial Intelligence, Cybersecurity, and Education Research (NSF 20-072), leading to 9.4 million investments through 34 EAGER projects.
- Serve on the OSTP/NITRD Information Integrity Working Group. This group works to coordinate federal efforts in research, development, and regulatory approaches to information integrity.
- Respond to Government Accountability Office (GAO) engagement on Cybercops® program covering award process, budget, evaluation, cost-benefit analysis, risk management, and compliance. The report is available at *Cybersecurity Workforce: Actions Needed to Improve Cybercorps Scholarship for Service Program* (GAO-22-105187). Work on submitting a written statement on actions taken or planned on the recommendations pursuant to 31 U.S.C. 720.
- Lead on Cybercops® federal regulation development, in consultation with the Department of Education (ED) and in collaboration with the Department of Homeland Security (DHS) and the Office of Personnel Management (OPM), to comply with National Defense Authorization Act 2014, amended in 2018 and 2021.

- Deliver a [biennial Congressional report that provides an overview of the CyberCorps program](). Work with OPM evaluation team to understand factors that influence graduation, internship, completion of program obligations, and retention after obligation.
- Partner with OPM and DHS to organize one fall job fair and one spring job fair to supply cybersecurity talents to government agencies. The job fair hosts more than 100 government organizations and more than 1,300 participants.
- Ensure broadening participation of women and underrepresented minorities. Broadening Participation in SFS program, build inclusive environments and increase the representation of students of all races, ethnicities, and genders earning cybersecurity graduate degrees.
- Process and manage awards different mechanisms including grants (CGIs), cooperate agreements, and Inter-agency agreements (IAAs 7600A and 7600B)
- Process awards with various sizes (EAGER is 300K, typical SaTC-EDU is 500K, typical SFS is 4 million dollars, SaTC Frontier is up to 10 million dollars, and AI Research Institute is up to 20 million dollars)
- Member of multiple federal working groups, e.g., The National Initiative for Cybersecurity Education (NICE), NIST Interagency Coordination Council (ICC) for cybersecurity education and workforce development.
- Serve as program officer for multiple NSF initiatives, including National AI Research Institute program, CyberTraining, Future of Work-Human Technology Frontier (FW-HTF).
- Conduct outreach to education and research communities through keynote speech and presentations.
- Interact with investigators from all disciplines (e.g., computer and information science, engineering, K-12 education, legal, etc.)
- Coordinate computer science education research group at NSF.

ABET Coordinator   Department of Computer Science and Engineering, UTC   2018-2019

Assistant Dean   College of Engineering and Computer Science, UTC   08/2016-07/2018

Duties in this position involve college governance, research profile building, partnership development, and student successes.

- College Governance: Worked closely with faculty and staff on the development of the CECS five-year strategic plan, workload guideline, and college bylaws. Built consensus and trust among faculty, and the college strategic planning, workload guidelines, and college bylaws were voted and approved by faculty of CECS. Led college hiring. Working with diversity and inclusion office, I designed uniform rubrics for application screening, phone interviews, campus interviews, and feedback collection, making the hiring process transparent and fair. Led college space allocation to optimize space for teaching, research, and student organizations. Led the rank, tenure, and promotion

process in the department and at the college levels, especially when the college designs post-tenure evaluation procedures.

- Research Profile Building: To support faculty working on basic and applied research, I initiated Distinguished Speaker Series with both research and professional development tracks, coordinated faculty research and promoted interdisciplinary collaboration through campus workshops, initiated college faculty education workshop on engineering and computing education, coordinated college faculty-to-faculty mentorship program; coordinated and mentored grant writing through partnership with Grant Writing Seminar and Workshop and Office of Research and Sponsorship; organized faculty field trips to meet their peers in the Oak Ridge National Laboratory and Georgia Technology Institute. I also led the first Technology Symposium and show cased over 120 projects to campus students, faculty, industry boards, and members in Chattanooga community. As a result, the college achieved not only increased scholarship, publication, and collaboration, but also increased external funding at a rate of 40% per year after above initiatives.

- Partnership Development: Partnership is very important to the CECS at UTC. We interact with college advisory board members on regular base for continuous partnership. More specifically, I outreached and built partnership with industries for research and sponsorship including Volkswagen, Tennessee Valley Authority, Erlanger Hospital, Electric Power Board, initiated college-wide high school open house on engineering and computing, connected with K-12 School District (Hamilton County) on "Future Ready Initiatives" , contributed curriculum mapping from community colleges to UTC documented as 2+2 articulation agreements with Chattanooga State, Dalton State, Cleveland State Community College. These are critical to provide a pathway for students from 2-year community college to 4-year learning environment, aligning with Tennessee Transfer Pathway (TTP).

- Student Success: To support evidence-based analysis, I initiated college-wide graduate exit surveys to collect and track data for assessment and continuous improvement. We started student ambassador program, institutionalized student success center, offer year-long peer tutoring, and work with local industry and community for student internship, co-op, and full-time employment opportunities.

Director of InfoSec Center, a National Center of Academic Excellence in Cyber Defense
2011-present

- Built Cybersecurity B.S. and M.S. program concentrations.
- Led the application for CAE-CDE in 2013 and received the re-designation of the National Center of Academic Excellence in Cyber Defense. The designation requires Knowledge Unit (KU) mapping and a set of program requirements. The KU mapping requires mapping of the institution's curriculum to the four-year core Knowledge Units (KUs) + 5 required optional (22 total) and demonstrate that a student can reasonably complete the necessary course of study to include all KUs identified.
- Formed industry advisory board for the center. Built partnership with industry and other academic institutions, securing federal grants in security research, education and

workforce development, and outreach, hosting and teaching annual faculty development workshops in cybersecurity, promoting K-12 cybersecurity education, advising student research, updating curriculum, and mentoring student cyber competition.

- Built partnership with HBCUs and Community Colleges. Mentored faculty from HBCUs (NC A&T, PVAMU, Tuskegee University). Tuskegee University to received CAE center and build capacity in securing funding in cybersecurity. The Tuskegee University and UTC collaborated on several NSF grants including the CyberCorps® Scholarship for Service (SFS) grant. PVAMU faculty secured NSA grant and provided training for Community College (CC) faculty.
- Outreached to local high schools (Chattanooga Girls Leadership Academy, Red Bank High School, Signal Mountain Middle/High School)

Graduate Coordinator   Department of Computer Science and
Engineering, UTC   2018-2016

- Doubled the graduate enrollment twice
- Created an accelerated pathway for M.S. program in CS for students with non-CS degree
- Chaired university graduate curriculum committee and served on graduate council for four years
- Built Ph.D. Computer Science concentration
- Built Data Science M.S. concentration
- Built Cybersecurity M.S. concentration
- Led the Tennessee Higher Education Commission (THEC) evaluation for computer science graduate program

Funded Grants (selected)

National Security Agency (NSA)

2019-2021
Artificial Intelligence and Machine Learning in Cybersecurity
Amount: $149,944
Role: Principal Investigator

Tennessee Department of Transportation (TDOT)

2019-2021
Activity-based Household Travel Survey through Smartphone Apps in Tennessee
Amount: $200,000
Role: Co-Principal Investigator

National Security Agency (NSA)

2019-2021
NSA/NSF GenCyber Teacher Camp
Amount: $62,072
Role: Principal Investigator

National Security Agency (NSA)

2017-2019
Web Security
Amount: $149,898
Role: Principal Investigator

National Science Foundation (NSF)

2017-2020
Developing Innovative Privacy Learning Modules to Engage Students in Cybersecurity Education

Amount: $300,000
Role: Co-Principal Investigator

National Science Foundation (NSF)

2017-2021
NSF CyberCorps: Strengthening the National Cyber Security Workforce
Amount: $1,522,456
Role: Lead-Principal Investigator

National Science Foundation (NSF) #1647175

2017-2020
NSF US Ignite: Collaborative Research: Focus Area 1: Fiber Network for Mapping, Monitoring and Managing Underground Urban Infrastructure
Amount: $299,884
Role: Co-Principal Investigator

National Security Agency (NSA)

2017-2019
NSA Cyber Security Curriculum Development Grant
Amount: $136,282

Role: Co-Principal Investigator

National Science Foundation (NSF) #1623624

2016-2019
NSF Collaborative Research: Enhancing Cyber Security Education Using POGIL
Amount: $164,997
Role: Principal Investigator

National Institute of Health (NIH)

2014-2017
NIH: mStroke: Mobile Technology for Post-stroke Recurrence Prevention and Recovery
Amount: $384,747
Role: PI with Mina Sartipi as lead-PI

National Science Foundation (NSF)

2013-2015
NSF SaTC: Collaborative Research: Collaborative Research: Bolstering Security Education
through Transiting Research on Browser Security
Amount: $119,869
Role: Principal Investigator

National Science Foundation (NSF)

2013-2015
S-STEM Making Opportunities for Computer Science and Computer Engineering Students
(MOCS)
Amount: $577,964
Role: Principal Investigator

National Science Foundation (NSF)

2012-2015
Capacity Building in Mobile Security through Curriculum and Faculty Development
Amount: $209,981
Role: Lead Principal Investigator

Tennessee Higher Education Commission (THEC)

2013-2014

Bioinformatics analysis of human genes associated with diseases at higher
rates in African Americans (DHRAAs)
Amount: $60,000
Role: Principal Investigator

Tennessee Higher Education Commission (THEC)

2012-2013

A Novel Authentication Framework in Mobile Devices
Amount: $54,000
Role: Principal Investigator

Tennessee Higher Education Commission (THEC)

2011-2012

Online Opinion Mining on Social Media
Amount: $54,244
Role: Principal Investigator

National Science Foundation (NSF)

2011-2013

Collaborative Project: Developing Faculty Expertise in Information Assurance through Case
Studies and Hands-on Experiences
Amount: $100,000
Role: Principal Investigator

National Science Foundation (NSF)

2010-2013

Collaborative Project: Teaching Cryptography through Hand-on Learning and Case Studies
Amount: $99,985
Role: Lead Principal Investigator

Women in Computing Research (CRA-W)

2010-2011

Collaborative Research Experiences for Undergraduates
Amount: $23,000

Role: Co-Principal Investigator

Department of Defense

<div align="center">2009-2010</div>

IASP Information Assurance Scholarships Program
Amount: $62,279
Role: Co-Principal Investigator

Oak Ridge National Laboratory

<div align="center">2009-2010</div>

Detecting Intrusions through Fusion of Program Behavior and Attacker Behavior
Amount: $17,746
Role: Principal Investigator

Tennessee Higher Education Commission (THEC)

<div align="center">2009-2010</div>

Emerging Infectious Disease: A Computational Multi-agent Model
Amount: $50,000
Role: Principal Investigator

Odor Wheeler Foundation

<div align="center">2008-2009</div>

Sustainable and Scalable Wireless Sensor Network to Monitor Chemical Concentration
Amount: $18,000
Role: Co-Principal Investigator

Tennessee Higher Education Commission (THEC)

<div align="center">2009-2010</div>

A Fast Response and Planning System in Disaster Management
Amount: $40,000
Role: Principal Investigator

UTC Faculty Summer Fellowship

May 2008-July 2008

Network Intrusion Detection Using Bayesian Networks
Amount: $5,000
Role: Principal Investigator

Tennessee Higher Education Commission (THEC)

2006-2007

Information Communications Mediator Model in Disaster Management
Amount: $33,250
Role: Principal Investigator

Publications

1. Omwenga, Maxwell M. and Wu, Dalei and Liang, Yu and **Yang, Li** and Huston, Dryver and Xia, Tian "Cognitive GPR for Subsurface Object Detection Based on Deep Reinforcement Learning" *IEEE Internet of Things Journal* , v.8 , 2021 https://doi.org/10.1109/JIOT.2021.3059281 Citation Details
2. Chen Xu, Ruipeng Zhang, Mengjun Xie, **Li Yang**, Network Intrusion Detection System as a Service in OpenStack Cloud, International Conference on Computing, Networking and Communications (ICNC), February 2020.
3. Maxwell M. Omwenga, Dalei Wu, Yu Liang, **Li Yang**, Dryver Huston, Tian Xia, Cognitive GPR for Subsurface Object Detection Based on Deep Reinforcement Learning, IEEE Internet of Things Journal, November 2020.
4. Li Yang, Xiaohong Yuan, Wu He, Jennifer Ellis, Cybersecurity Education with POGIL: Experiences with Access Control Instruction. Journal of The Colloquium for Information System Security Education, 2019.
5. Omwenga, Maxwell M. and Wu, Dalei and Liang, Yu and Yang, Li and Huston, Dryver and Xia, Tian, Autonomous Cognitive GPR Based on Edge Computing and Reinforcement Learning, *2019 IEEE International Conference on Industrial Internet (ICII)*, 2019 https://doi.org/10.1109/ICII.2019.00066
6. Zhang, Ruipeng & Xie, Mengjun & Yang, Li. (2019). Isoflat: Flat Provider Network Multiplexing and Firewalling in OpenStack Cloud. 1-7. 10.1109/ICC.2019.8761652.
7. Dalei Wu, Maxwell M. Omwenga, Yu Liang, Li Yang, Dryver Huston, Tian Xia, A Fog Computing Framework for Cognitive Portable Ground Penetrating Radars, 2019 IEEE International Conference on Communications (ICC), Shanghai, China, May 2019.
8. Sharmila Chackravarthy, Steven Schmitt, Li Yang, *Crime Related Anomaly Detection Using Stream Analytics,* The 1st International Workshop on Technology Convergence for Smart Cities (TeC4C), in conjunction with IEEE 4th International Conference on Collaboration and Internet Computing, Philadelphia, PA, *October 2018.*

9. Almaimani, Maha and Wu, Dalei and Liang, Yu and **Yang, Li** and Huston, Dryver and Xia, Tian "Classifying GPR Images Using Convolutional Neural Networks" *MOBIMEDIA 2018*, https://doi.org/10.4108/eai.21-6-2018.2276629

10. Li Yang, Yu Liang, Dalei Wu, Jim Gault, Train and Equip Firefighters with Cognitive Virtual and Augmented Reality, First International Workshop on Emerging Cloud, IoT and Social Network Solutions for e-Health, in conjunction with IEEE 4th International Conference on Collaboration and Internet Computing, Philadelphia, PA, *October 2018*.

11. Wu He, Xiaohong Yuan, Li Yang, Jennifer Ellis, Li Xu, Using POGIL to help students learn secure coding, IEEE Frontiers in Education Conference (FIE), October 2018.

12. Li Yang, Xiaohong Yuan, Wu He, Jennifer Ellis, Jonathan Land, Cybersecurity Education with POGIL: Experiences with Access Control Instruction, New Orleans, LA, June 2018.

13. Héctor Suárez, Li Yang, Dalei Wu, *Securing GPR data for Use in Smart Cities*, IEEE Internationa Workshop on Big Data Security and Services, Bamberg, Germany, March 2018.

14. David Schwab, Lama ALharbi, Oliver Nichols, Li Yang, *Picture PassDoodle: Usability Study*, Internationa Workshop on Big Data Security and Services, Bamberg, Germany, March 2018.

15. Héctor Suárez, Hooper Kincannon, Li Yang, *SSETGami: Secure Software Education Through Gamification*, Conference on Cybersecurity Education, Research and Practice (CCERP), Kennesaw, GA, October, 2017.

16. David Schwab, Li Yang, Katherine Winters, Matthew Jallouk, Emile Smith, Adam Claiborne, *A Secure Mobile Cloud Photo Storage System*, W*orkshop on Network Security Analytics and Automation (NSAA)*, in conjunction with the 26th International Conference on Computer Communications and Networks, Vancouver, Canada, August, 2017.

17. Xiaohong Yuan, Li Yang, Wu He, Jennifer Ellis, Jinsheng Xu and Cynthia Waters, Enhancing Cybersecurity Education Using POGIL, the *ACM Technical Symposium on Computer Science Education (SIGCSE)*, poster, Seattle, WA, March, 2017.

18. Farah I. Kandah, Oliver Nichols, Li Yang, Efficient Key Management for Big Data Gathering in Dynamic Sensor Networks, *Workshop on Computing, Networking and Communications (CNC)*, Silicon Valley, USA, January, 2017.

19. Oliver Nichols, Li Yang, Xiaohong Yuan, Teaching Security of Internet of Things in Using RaspberryPi, Conference on Cybersecurity Education, Research and Practice (CCERP), Kennesaw, GA, October, 2016.

20. Xiaohong Yuan, Wu He, Li Yang, Lindsay Simpkins, Teaching Security Management for Mobile Devices, Annual Conference on Information Technology Education (SIGITE), Boston, September, 2016.

21. Oliver Nichols, Li Yang, Picture PassDoodle: An Authentication Alternative to Text Passwords, Workshop on Network Security Analytics and Automation, August, 2016.

22. Minzhe Guo, Kai Qian, Li Yang, Hands-on Labs for Learning Mobile and NoSQL Database Security, COMPSAC, Atlanta, GA, June 2016.
23. Eric Reinsmidt, David Schwab, Li Yang, Securing a Connected Mobile System for Healthcare, the 17th IEEE High Assurance Systems Engineering Symposium (HASE 2016), Orlando, FL January, 2016.

24. Xinwen Fu, Li Yang, Modeling Cyber Crime and Investigation Strategies for Digital Forensics Education, The Colloquium for Information Systems Security Education, round table discussion, June 2015.

25. Eric Reinsmidt, Li Yang Mobile Authentication Methodologies in Healthcare Systems, the 26th Modern Artificial Intelligence and Cognitive Science Conference (MAICS), Greensboro, NC, April, 2015.

26. Lindsay Simpkins, Xiaohong Yuan, Jwalit Modi, Justin Zhan, Li Yang. A Course Module on Web Tracking and Privacy, InfoSecCD 2015 conference.

27. Wenliang Du, Li Yang, Xiaohong Yuan, Joseph Kizza, Browser Security Hands-on Labs and Case Studies, poster presentation at NSF SaTC PI meeting, January, 2015.
28. Li Yang, Xiaohong Yuan and Dhaval Patel, Interactive Visualization Tools for Cross-Site Scripting and Cross-Site Request Forgery Attack, *3rd International Conference on Human Computing, Education and Information Management System (ICHCEIMS 2014)*, Sydney, Australia, June 4 – 5, 2014.
29. Perron Johnson, Philip Harris, Keheira Henderson, Xiaohong Yuan, Li Yang, A Course Module on Mobile Malware, Information Security Curriculum Development (InfoSecCD), Knennesaw, GA, October, 2014.

30. Wenliang Du, Li Yang, Joseph Kizza, Xiaohong Yuan, New Hands-on Labs on Browser Security, poster SIGCSE 2014, Atlanta, GA.
31. Xiaohong Yuan, Kenneth Williams, Huiming Yu, Bei-Tseng Chu, Audrey Rorer, Li Yang, Kathy Winters, Joseph Kizza, Developing Faculty Expertise in Information Assurance through Case Studies and Hands-on Experiences, the Proceedings of the 48th the Hawaii International Conference on System Sciences (HICSS), January 2014.
32. Minzhe Guo, Prabir Bhattacharya, Kai Qian and Li Yang, WIP: Authentic Learning of Mobile Security with Case Studies, Frontiers in Education Conference (FIE), October 2013.
33. Li Yang and Xumin Liu, Work in Progress: Teaching Business Analytics, Frontiers in Education Conference (FIE), October 2013.
34. Minzhe Guo, Kai Qian, Ming Yang, KuoSheng Ma, Liang Hong, Li Yang, Android-Based Mobile Sensory System Labware for Embedded System Education, IEEE International Conference on Advanced Learning Technologies (ICALT), Beijing, China, July 2013.
35. Ming Yang, Kai Qian, Minzhe Guo, Prabir Bhattacharya, Guillermo Francia, Li Yang, Enhance Computer Networks Learning with Hands-on Mobile Device Based Labware,*Proceedings of the ACM Technical Symposium on Computer Science Education (SIGCSE)*, March 2013.

36. Minzhe Guo, Prabir Bhattacharya, Ming Yang, Kai Qian, Li Yang, Learning Mobile Security with Android Security Labware, *Proceedings of the ACM Technical Symposium on Computer Science Education (SIGCSE)*, March 2013.

37. David Schwab, Li Yang, User and Device Authentication in a Mobile Cloud Environment, *The Proceedings of Cyber Security and Information Intelligence Research Workshop*, ACM Digital Library, Oak Ridge, TN, January, 2013.

38. Wade Gasior and Li Yang, Exploring Covert Channel in Android Platform, Cyber Security Conference, Washington D.C., pages 516-520, December, 2012.

39. Hong Qin, Alexander Shapiro, and Li Yang, Emerging Infectious Disease: A Computational Multi-agent Model, BioMedCom Conference, Washington D.C., pages 583-588, December, 2012.

40. Kai Qian, Prabir Bhattacharya, Minzhe Guo, Li Yang, Work in Progress: Real World Relevant Security Labware for Mobile Threat Analysis and Protection Experience, Frontier in Education, Seattle, WA, November, 2012.

41. Li Yang, Joseph Kizza, Andy Wang, C. H. Chen, Teaching Cryptography Using Hands-on Labs, poster, *The 43rd ACM Technical Symposium on Computer Science Education (SIGCSE)*, Raleigh, NC, March, 2012.

42. Wade Gasior, Li Yang, Covert Channel in Smart Phones, Work in Progress (WiP), *The 27th Annual Computer Security Applications Conference (ACSAC)*, Orlando, FL, December, 2011.

43. Rajeshwar Katipally, Li Yang, Anyi Liu, Attacker Behavior Analysis in Multi-stage Attack Detection, *the Proceedings of Cyber Security and Information Intelligence Research Workshop*, ACM Digital Library, Oak Ridge, TN October, 2011.

44. Wade Gasior, Li Yang, Network Covert Channels on the Android Platform, *the Proceedings of Cyber Security and Information Intelligence Research Workshop*, ACM Digital Library, Oak Ridge, TN October, 2011.

45. Li Yang, Mina Sartipi, Matt McNeely, Usable Protection to Healthcare Application, *the Proceedings of Cyber Security and Information Intelligence Research Workshop*, ACM Digital Library, Oak Ridge, TN October, 2011.

46. Swetha Dasireddy, Wade Gasior, Xiaohui Cui and Li Yang, Visualization and Clustering in Network-based Intrusion Detection, *the Proceedings of Cyber Security and Information Intelligence Research Workshop*, ACM Digital Library, Oak Ridge, TN 2010.

47. Rajeshwar Katipally, Wade Gasior, Xiaohui Cui and Li Yang, Multi stage attack Detection system for Network Administrators using Data Mining, *the Proceedings of Cyber Security and Information Intelligence Research Workshop*, ACM Digital Library, Oak Ridge, TN 2010.

48. Kai Qian, Li Yang, Innovative CS Capstone Project For Green Smart Computing With WSN In A Box, *The 10th IEEE International Conference on Advanced Learning Technologies*, 2010.

49. Li Yang, Wade Gasior, Woodlyn Madden, Mark Hairr, Ronald Bailey, Electronic Vehicle Simulation and Animation, *51st Annual Transportation Forum*, March 2010.

50. Harkeerate Bedi, Li Yang, Joseph Kizza, Biometrics based Fair Electronic Exchange, *the Proceedings of Cyber Security and Information Intelligence Research Workshop*, ACM Digital Library, Oak Ridge, TN 2009.

51. Li Yang, Alma Cemerlic, Integrating Dirichlet Reputation into Usage Control, *the Proceedings of Cyber Security and Information Intelligence Research Workshop*, ACM Digital Library, Oak Ridge, TN 2009.
52. Li Yang, Feiqiong Liu, Joseph M. Kizza, Raimund K. Ege. Discovering Latent Topics from Dark Websites, *IEEE Symposium on Computational Intelligence in Cyber Security*, IEEE Xplore, April 2009.
53. Ran Tao, Li Yang, Lu Peng, Bin Li, Alma Cemerlic. DoS Network Intrusion Detection through Multi-layer Features, *IEEE Symposium on Computational Intelligence in Cyber Security*, IEEE Xplore, April 2009.
54. Raimund K. Ege, Li Yang, and Richard Whittaker, Extracting Value from P2P Content Delivery, *Proceedings of The Fourth International Conference on Systems and Networks Communications (ICSNC)*, IEEE Xplore, France, March 2009.
55. Li Yang, Teaching Database Security and Auditing, *Proceedings of the 40th ACM Technical Symposium on Computer Science Education (SIGCSE)*, Chattanooga TN, March 2009.
56. Alma Cemerlic, Li Yang, Joseph M. Kizza, Network Intrusion Detection Based on Bayesian Networks, *Proceedings of Software Engineering and Knowledge Engineering (SEKE08)*, July 2008.
57. Li Yang, Raimund Ege, Integrating Trust Management into Usage Control in P2P Multimedia Delivery, *Proceedings of Software Engineering and Knowledge Engineering (SEKE08)*, July 2008.
58. Hong Qin, Li Yang, Detection of changes in transitive associations by shortest-path analysis of protein interaction networks integrated with gene expression profiles, *The International Conference on BioMedical Engineering and Informatics (BMEI)*, IEEE publisher, Hainan, China, May, 2008.
59. Li Yang, Kathy Winters, Joseph M. Kizza, Biometrics Education with Hands-on Labs, *Proceedings of the 46th annual southeast regional conference*, ACM Digital Library, March, 2008.
60. Raimund Ege, Li Yang, Secure P2P Delivery of Multimedia, *Proceedings of International Conference Telecommunications, Networks and Systems (TNS) from International Association for Development of the Information Society (IADIS)*, Lisbon, Portugal, July 2007.
61. Li Yang, Joseph M. Kizza, Alma Cemerlic, Feiqiong Liu, Fine-Grained Reputation-based Routing in Wireless Ad Hoc Networks, *Proceedings of IEEE International Conference on Intelligence and Security Informatics*, New Brunswick, NY, May 2007.
62. Li Yang, Lu Peng, SecCMP: A Secure Chip-Multiprocessor Architecture, *Proceedings of Workshop on Architectural and System Support for Improving Software Dependability (ASID)*, in conjunction with International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), ACM digital library, pages 72-76, San Jose, CA, October 2006.
63. Joseph M. Kizza, Li Yang, Andy Novobilski, Kathy Winters, *Total Municipal Awareness Systems (TMAS) Capstone Project. Proceedings of Frontiers in Education*, Worldcomp, June 26-29, 2006.

64. Li Yang, Joseph M. Kizza, Raimund K. Ege, Malek Adjouadi, A Relationship-based Flexible Authorization Framework for Mediation Systems, *Proceedings of Software Engineering and Knowledge Engineering (SEKE)*, pages 381-385, San Francisco, CA, July, 2006.
65. Li Yang, Raimund K. Ege, Dynamic Integration Strategy for Mediation Framework. *Proceedings of International Conference on Software Engineering and Knowledge Engineering (SEKE'05)*, Taipei, Taiwan, Republic of China, 2005.
66. Li Yang, Raimund K. Ege and Huiqun Yu, Modeling and Verifying Mediation Framework. *Proceedings of The 10th IEEE International Conference on the Engineering of Complex Computer Systems (ICECCS)*, Shanghai, China, 2005.
67. Li Yang, Raimund K. Ege, and Huiqun Yu. Security specification and enforcement in heterogeneous databases. *Proceedings of The 20th Annual ACM Symposium on Applied Computing (SAC'05)*, Computer Security Track, Santa Fe, New Mexico, March, 2005.
68. Li Yang and Raimund K. Ege. A role-based access control model for information mediation, *Proceedings of The 2004 IEEE International Conference on Information Reuse and Integration (IEEE IRI)*, Las Vegas, NV, pages 277-282, 2004.
69. Onyeka Ezenwoye, Raimund K. Ege, Li Yang, and Qasem Kharma. A mediation framework for multimedia delivery. *Proceedings of Third International Conference on Mobile and Ubiquitous Multimedia (MUM'04),* ACM Digital Library, College Park, Maryland, October 2004.
70. Li Yang, Raimund K. Ege, and Huiqun Yu. Enhancing mediation security by aspect-oriented approach. *Proceedings of Software Engineering and Knowledge Engineering (SEKE)*, Banff, Alberta, Canada, pages 155-160, June 2004.
71. Raimund K. Ege, Li Yang, Qasem Kharma, and Xudong Ni. Three-layered mediator architecture based on DHT. *Proceedings of International Symposium on Parallel Architectures, Algorithms, and Networks (I-SPAN)*, IEEE Computer Society Press, Hong Kong, May 2004.
72. Li Yang and Raimund K. Ege. Modeling and verification of real-time mediation systems. *Proceedings of Advanced Simulation Technologies Conference (ASTC)*, Arlington, Virginia, pages 61-68, April 2004.

Courses Taught

- CPSC 1100 - Fundamentals of Computer Science
- CPSC 1110 - Data Structures and Program Design
- CPSC 2100 - Software Design and Development
- CPSC 2800 - Introduction to Operating Systems
- CPSC 3200 - Algorithm Analysis and Advanced Data Structures
- CPSC 3220 - File and Database Processing
- CPSC 3600 - Principles of Information Security and Assurance
- CPSC 4230 - Introduction to Decision Support and Business Intelligence
- CPSC 4270 - Database and Security
- CPSC 4600 - Biometrics and Cryptography
- CPSC 4610 - Information Security Management
- CPSC 4620 - Computer Network Security

- CPSC 4660 - System Vulnerability Analysis and Auditing
- CPSC 4900 - Software Engineering
- CPSC 4910 - Senior Capstone Project
- CPSC 5110 - Mobile Computing
- CPSC 5220 - Advanced Database Systems
- CPSC 5230 - Decision Support and Business Intelligence
- CPSC 5270 - Advanced Database and Database Security
- CPSC 5590 - Advanced Computer Networks
- CPSC 5600 - Advanced Biometrics and Cryptography
- CPSC 5610 - Advanced Information Security Management
- CPSC 5620 - Computer Network Security
- CPSC 5660 - System Vulnerability Analysis and Auditing
- CPSC 5670 - Database Security and Auditing
- CPSC 5800 - Advanced Topics in Systems Software
- CPSC 5900 - Project
- CPSC 5999r - Thesis

Curriculum Development

- CPSC 4110 - Introduction to Mobile Computing
- CPSC 4130 - Introduction to Cloud Computing
- CPSC 4140 - Wide Area Networks
- CPSC 4180 - Programming Languages for Advanced Data Analytics
- CPSC 4240 - Principles of Data Analytics
- CPSC 4430 - Introduction to Machine Learning
- CPSC 4440 - Introduction to Artificial Intelligence
- CPSC 5180 - Programming Languages for Advanced Data Analytics
- CPSC 5240 - Principles of Data Analytics
- CPSC 5440 - Introduction to Machine Learning
- CPSC 5450 - Advanced Topics in Artificial Intelligence
- CPSC 5530 - Data Visualization and Exploration
- CPSC 7220 - Bioinformatics
- CPSC 7240 - Computational Genomics
- CPSC 7250 - Advanced Data Science
- CPSC 7600 - Secure Software Engineering
- CPSC 7610 - Information Security Theory and Practice
- CPSC 7910 - Special Topics in Computer Science and Engineering
- CPSC 7930 - Graduate Seminar
- CPSC 7950r - Doctoral Research
- CPSC 7999r - Dissertation

Professional Experiences and Services

2007, 2012, 2016, 2017, 2018:   NSF Panelist

2020

                                                 NIH Review Panel

2016- Present   Faculty advisor of CCDC competition at UTC

2018 – Present   Faculty advisor of ACM student chapter at UTC

2018 – Present   UTC's representative on University of Tennessee research committee

2018-2019   Serve as reviewer for Florida CyberRange

2017- Present   College governance committee

2017-Present   College research and outreach committee

2017-Present   Chair RTP committee for Department of Engineering Management and Technology

2011-Present   RTP committee in Department of Computer Science and Engineering

2019-Present   RTP committee in the College of Engineering and Computer Science

2018-2019   Department Head search committee

2015-2016   Built Ph.D. concentration in Computer Science at UTC

2014 – 2015:   Think/Achieve Advisory Board at UTC

2014 - 2015:   Committee on IT budget planning

2014-2015:   Memorandum of Understanding for a Coordinated Graduate Computer Science and   Engineering Degree Program between The University of Tennessee at Chattanooga And East China University of Science and Technology, and Shanghai Institute Technology

2007, 2015:   Dean's search committee, College of Engineering and Computer Science, UTC

2013 - 2015:   Committee on the UT at Chattanooga Strategic Plan 2008-2013

2013-2014   Built a new interdisciplinary undergraduate and graduate concentration in Data Science

2013:   Advisory Board of Women in Cyber Security

2005 - Present: Master Thesis Committee, University of Tennessee at Chattanooga (UTC)

2008-2012:   Graduate Council

2008-2012:   Graduate Curriculum Committee

2008-2014:   University Institutional Review Board

2007-2011:   UTC Faculty Senate

2006   Built B.S. cybersecurity concentration at UTC

2006, 2007, 2010, 2012, 2013: Reviewers of IEEE FIE, CISSE, SREC, ACM MSE, etc.

2007-Present   Serve Master Thesis Defense Committee

2007-2008   University Research Committee, 2007-2008

2007-2012	Faculty Senate as a representative of CECS, 2007-2009
2005-present	Serve on CPSC Curriculum Committee

Mentoring Experiences (selected)

- Advise Ph.D. dissertation on differential privacy by Justin Joshuva, graduated 2022

- Advise Ph.D. dissertation on intrusion detection with deep learning by David Schwab, expected fall 2022

- Served on Ph.D. dissertation committee on Analyzing Disaster related Twitter Data and Identifying Panic Triggers for Cyber Disruption Prevention and Emergency Response Enhancement by Nasser Assery at University of North Carolina A&T State University

- Advised M.S. students on keystroke biometrics by Hector Suarez

- Advised master thesis on "Social Media Mining" by Andy Duncan.

- Advised master thesis on "Covert Channel on the Android Platform" by Wade Gasior

- Advised master thesis on "Multistage Attack Detection and Attacker Behavior Analysis System for Network Administrators" by Rajeshwar Katipally

- Advised master thesis on "Alerts Visualization and Multi Stage Attack Detection System" by Swetha Dasireddy

- Advised graduate project on "Emerging Infectious Disease: A Computational Multi-agent Model" by Alexander Shapiro

- Advised master thesis on "Fair Electronic Exchange by Biometrics" by Harkeerat Bedi

- Advise master thesis on "Fine-Grained Reputation-based Routing in Wireless Ad- hoc Networks" by Alma Cemerlic

- Advised graduate project titled as "LDA based Dark Web Analysis" by Feiqiong Liu

- Advised graduate project titled as "Integrate Trust into Usage Control in File Sharing" by "Chang Phuong"

Yukun Yuan

yukun-yuan@utc.edu; https://www.yukunyuan.org;
423-425-4384; EMCS 314, 615 McCallie Ave. Chattanooga, TN 37403, USA

Research interests

Cyber-Physical Systems, Internet of Things, Machine Learning, Smart Cities

Employment

08/2022 – Present Tenure-track Assistant Professor, Department of Computer Science &
Engineering, University of Tennessee at Chattanooga

Education

08/2015 – 08/2022 Stony Brook University – Stony Brook, NY, USA
Ph.D. in Computer Engineering, Advisor: Prof. Shan Lin.
Thesis: Data-driven Coordination of Heterogeneous Systems in Cyber-Physical Systems

08/2011 – 07/2015 Shanghai Jiao Tong University – Shanghai, China
B.E. in Computer Science

Honors and awards

2022 CPS Rising Star (University of Virginia)
2021 Best Paper Award (ICCPS 2021)
2021 IEEE CSS Student Travel Support (CDC 2021)
2020, 2019 Student Travel Award (ICDCS 2019, IFIP Networking 2020)
2018 Professional Development Award (Stony Brook University)

Publications

Conference

[C1] SECON'22 Game Theoretic Analysis of Urban E-Taxi Systems: Equilibria and Efficiency.
Yukun Yuan, Yue Zhao, Lin Chen, and Shan Lin. In IEEE International Conference on Sensing,
Communication, and Networking (SECON), 2022 (Acceptance rate: 26.1%).

[C2] e-Energy'22 POET: Towards Power-System-Aware E-Taxi Fleet Coordination under
Dynamic Passenger Mobility. Yukun Yuan, Yue Zhao and Shan Lin. In International Conference
on Future Energy Systems (ACM e-Energy), 2022. (Acceptance rate: 29.3%). Citation: 1.

[C3] ACC'22 SOURCE: Towards Solar-Uncertainty-Aware E-Taxi Coordination under Dynamic
Passenger Mobility. Yukun Yuan, Yue Zhao and Shan Lin. In 2022 American Control
Conference (ACC), 2022. Citation: 2.

[C4] CDC'21 SAC: Solar-Aware E-Taxi Fleet Charging Coordination under Dynamic Passenger
Mobility. Yukun Yuan, Yue Zhao and Shan Lin. In 60th IEEE Conference on Decision and
Control (CDC), 2021. Citation: 4.

[C5] ICCPS'21 DeResolver: A Decentralized Negotiation and Conflict Resolution Framework for Smart City Services. Yukun Yuan, Meiyi Ma, Songyang Han, Desheng Zhang, Fei Miao, John A. Stankovic, and Shan Lin. In ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS), 2021. (Acceptance rate: 26%). Best Paper Award. Citation: 2.

[C6] IoTDI'20 Leveraging Fine-grained Occupancy Estimation Patterns for Effective HVAC Control. Yukun Yuan, Kin Sum Liu, Sirajum Munir, Jonathan Francis, Charles Shelton, and Shan Lin. In ACM/IEEE Conference on Internet of Things Design and Implementation (IoTDI), 2020. (Acceptance rate: 35.3%). Citation: 4.

[C7] ICII'19 QoE Control for Dynamic Adaptive Video Streaming over HTTP at Access Point. Yukun Yuan, Shan Lin, and Gang Zhou. In IEEE International Conference on Industrial Internet (ICII), 2019

[C8] ICDCS'19 ρ^2 Charging: Proactive Partial Charging for Electric Taxi Systems. Yukun Yuan, Desheng Zhang, Fei Miao, Jiming Chen, Tian He, and Shan Lin. In IEEE 39th International Conference on Distributed Computing Systems (ICDCS), 2019. (Acceptance rate: 19.6%). Citation: 32.

[C9] ICCPS'18 Dynamic Integration of Heterogeneous Transportation Modes under Disruptive Events. Yukun Yuan, Desheng Zhang, Fei Miao, John A. Stankovic, Tian He, George Pappas, and Shan Lin. In ACM/IEEE 9th International Conference on Cyber-Physical Systems (ICCPS), 2018. (Acceptance rate: 30%). Citation: 7.

Journal
[J1] TCPS'22 DeResolver: A Decentralized Conflict Resolution Framework with Autonomous Negotiation for Smart City Services. Yukun Yuan, Meiyi Ma, Songyang Han, Desheng Zhang, Fei Miao, John A. Stankovic, and Shan Lin. In ACM Transactions on Cyber-Physical Systems.

[J2] TMC'21 eRoute: Mobility-Driven Integration of Heterogeneous Urban Cyber-Physical Systems under Disruptive Events. Yukun Yuan, Desheng Zhang, Fei Miao, John A. Stankovic, Tian He, George Pappas, and Shan Lin. In IEEE Transactions on Mobile Computing (TMC). (Impact factor: 5.112). Citation: 2.

Teaching experience
Fall 2022 Lecturer, CPSC 4550: Computer Networks, UTC
Fall 2022 Lecturer, CPSC 5590: Advanced Computer Networks, UTC

Talks and tutorials
Sept. 2022 Game Theoretic Analysis of Urban E-Taxi Systems: Equilibria and Efficiency. SECON'22
June 2022 POET: Towards Power-System-Aware E-Taxi Fleet Coordination under Dynamic Passenger Mobility. ACM e-Energy'22
June 2022 SOURCE: Towards Solar-Uncertainty-Aware E-Taxi Coordination under Dynamic Passenger Mobility. ACC'22
May 2022 Data-driven Coordination of Heterogeneous Systems in Cyber-Physical Systems.

University of Tennessee at Chattanooga
Dec. 2021 SAC: Solar-Aware E-Taxi Fleet Charging Coordination under Dynamic Passenger Mobility. CDC'21
May 2021 DeResolver: A Decentralized Negotiation and Conflict Resolution Framework for Smart City Services. ICCPS'21
April 2020 Leveraging Fine-grained Occupancy Estimation Patterns for Effective HVAC Control. IoTDI'20
Nov. 2019 QoE Control for Dynamic Adaptive Video Streaming over HTTP at Access Point. ICII'19
July 2019 ρ^2 Charging: Proactive Partial Charging for Electric Taxi Systems. ICDCS'19
April 2018 Dynamic Integration of Heterogeneous Transportation Modes under Disruptive Events. ICCPS'18

Mentorship and service
Journal & Conference Reviewer
– ACM Transactions on Sensor Networks (TOSN)
– IEEE Global Communications Conference (GLOBECOM 2021)
– ACM/SIGAPP Symposium on Applied Computing (SAC 2021)
– IEEE International Conference on Computer Communications (INFOCOM 2017, 2018, 2021, 2022, 2023)
– IEEE International Conference on Mobile Ad-hoc and Sensor Systems (MASS 2017)

EISA MOHAMED

Chattanooga, TN 37405
Email: eisayahyaahmed@gmail.com

PROFESSIONAL EXPERIENCE

Adjunct Lecturer   **Aug 2021 - present**
The University of Tennessee at Chattanooga,   *Chattanooga, TN*
- Teaching Computer Science undergraduate and graduate courses.
- A member of the department of Computer Science and Engineering Load Polciy Committee.
- Providing support to students and other colleagues.

Adjunct Lecturer   **Aug 2020 – Jul 2021**
The University of Tennessee at Chattanooga,   *Chattanooga, TN*
- Teaching Computer Science undergraduate courses.

Associate Business Analyst   **Jun 2020 – Jul 2021**
MOSAIC CPA Inc.,   *Baltimore, MD*
- Designing, developing, maintaining and consciously improving a suite of reports and dashboards.
- Analyzing data from a variety of sources in order to provide business insights.
- Providing recommendations to senior department managers on performance and potential areas for action.

Adjunct Lecturer   **Jan 2020 – Jul 2021**
The University of Tennessee at Chattanooga,   *Chattanooga, TN*
- Teaching the courses: Fundamentals of Computer Science (CPSC1100), Data Structures and Program Design (CPSC1110), Algorithm Analysis and Advanced Data Structures (CPSC3200), Software Design and Development (CPSC2100), Survey of Programming Languages (CPSC4100) and Programming Languages for Business Data Analytics (CPSC5175).
- Setting up and grading assignments, tests, and exams.

Research & Teaching Assistant   Jan 2018 – Dec 2019

The University of Tennessee at Chattanooga

Chattanooga, TN

- Involved in research topics on Artificial Intelligence in Software Security using Machine Learning tools. Also, research topics on Browser Extensions and High Performance Computing.
- TA for the labs: Fundamentals of Computer Science (using Visual Logic and Java), Software Design and Development (using Python), Data Structures and Program Design (using Java), and Digital Logic and Introduction to Computer Hardware.

Core Network Back Office Engineer   Jan 2017 – Aug 2017

Huawei Technologies Sudanese Co. Ltd

Khartoum, Sudan

- Used to troubleshoot L1 and L2 Alarms for all Core Network and associated elements and restore the service based on SLA. Conducted planning and implementation for disaster recovery tasks.
- Used to perform routine preventive maintenance and analysis on all core network elements, core network related dimensioning and planning, and end to end optimization.
- Used to conduct daily health check for Core network and reporting KPIs on daily, weekly and monthly basis.

CS Core Support Engineer   Oct 2014 – Dec 2016

Sudanese Telecommunication Co. LTD. Zain SD

Khartoum, Sudan

- Used to deliver system support and operation and maintenance to Zain Sudan Core Network.
- Used to ensure that performance and inspection work is conducted in line with recognized engineering practices as well as manufacturers recommended procedures.
- Used to manage customer complaints and propose network enhancing performance changes.

Lecturer   Jun 2012 – Aug 2017

University of Khartoum

Khartoum, Sudan

- Instructed courses in Electronics, Signals and Systems, Digital Design, Digital Signal Processing, Computer Graphics, Data Structures, Programing Languages (Pascal & C), and Object Oriented Programming Using C++.

- Supervised final year students' projects and dissertations.

Secretary (Administrative Assistant) & Examinations Coordinator   Nov 2011 – Feb 2015
Department of Electrical & Electronic Engineering, University of Khartoum
Khartoum, Sudan
- Used to respond to messages and emails from other departments and faculties.
- Organized and serviced department meetings (producing agendas and taking minutes).
- Prepared and collated department's announcements, class schedules and grades reports.
- Supervised the printing, photocopying, distributing and scheduling of the exams.
- Managed department databases of student academic records, and filling.

NMC Engineer   Apr 2008 – Sep 2014
Sudanese Telecommunication Co. LTD. Zain SD
Khartoum, Sudan
- Ensured continuous network supervision of all Zain SD Network nodes and segments
- Provided 1st line O&M including accurate and timely problem remedy, escalation, and resolution of failures in the shortest possible time and within set reaction and remedy time targets applicable to various fault categories
- Performed assessment, implementation, and review of change requests in accordance with change management processes
- Gathered statistical network performance data for performance analysis
- Ensured compliance with all applicable policies & regular requirements on Information Security.

Teaching Assistant   Sep 2006 – May 2011
The University of Khartoum   Khartoum, Sudan
- Instructed labrotary sessions for Digital Systems and Programming Languages (Pascal, C, C++, Matlab, Octave and Pspice) courses
- Leaded tutorial sessions for Math, Electronics, Digital Design, Digital Signal Processing, Communications, Networking, and Electrical Circuits courses

Research Assistant   Jun 2006 – Sep 2006
Nile Electronic Systems Centre   Khartoum North, Sudan
• Designed and developed software to manage a group of sensors using Socket

Programming.

Maintenance Engineer   **Feb 2006 – Apr 2006**
  Leader Computer Company
Khartoum, Sudan
- Maintained falts in customers' computers and networks.

-

Assembled and installed Windows and other software for new computers.

EDUCATION
Master of Science in Computer Science (Data Science)   **Dec 2019**
*The University of Tennessee at Chattanooga, TN, USA (*GPA: 4.0/4.0)
Master of Science in Computer Architecture & Networking
Oct 2011 *University of Khartoum, Khartoum, Sudan*
Bachelor of Science Honors (first Class honors) in Electronics Engineering
Aug 2005 *University of Khartoum, Khartoum, Sudan (*GPA: 3.36/4.0)

SKILLS

Software Applications: PSpice, MATLAB, Oracle Database, SQL, Eclipse, BlueJ, OpenGL.
Programming Languages: Pascal, C, C++, Python, Java, Java Script, HTML, CSS, SQL, R.
Microsoft Office: Word, Excel, PowerPoint and Access.
Course Management Systems: Canvas, Blackboard **Machine Learning tools:** Scikit Learn, TensorFlow, Keras.io.
Operating systems: Windows, Linux.
Languages: English (Good), Arabic (Native Speaker), Fur (Mother tounge), Deutch (Beginer) and French (Beginer).
Soft Skills: Time Management, Fast Learner, leadership, presentation

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REFERENCES
- Available upon request

Katherine H. Winters

Computer Science Department   Phone: 423-605-4183
University of Tennessee at Chattanooga   Email: Kathy-Winters@utc.edu
615 McCallie Avenue
Chattanooga, TN 37405

Professional Preparation

University of Tennessee at Chattanooga	Computer Science	B.S., 1981
University of Tennessee at Chattanooga	Engineering Management	M.S., 1998
University of Tennessee at Chattanooga	Computer Science	M.S., 2007

Appointments

2017(Fall) – Present   *Adjunct*—The University of Tennessee at Chattanooga
College of Engineering and Computer Science

2004(Fall) – 2017   *Lecturer*—The University of Tennessee at Chattanooga
College of Engineering and Computer Science

1999 (Fall) – 2004(Summer) *Instructor*—The University of Tennessee at Chattanooga
College of Engineering and Computer Science

1999 (Spring)   *Adjunct Instructor*—The University of Tennessee at Chattanooga
College of Engineering and Computer Science

1998 (Fall) – 1999(Spring)   *Adjunct Professor*—Chattanooga State Technical Community College
The Department of Business and Information Systems

1977 - 1997   **Engineering Processes Specialist and Computer Science Positions**— Tennessee
Valley Authority

Publications Most Closely related to the Proposed Project

1. Li Yang, Kathy Winters, Joseph M. Kizza, Biometrics Education with Hands-on Labs, *ACM Southeast Conference,* ACM digital Library, March 2008.

2. Joseph Kizza, Li Yang, Andy Novobilski and Kathy Winters, *TMAS A Capstone Project,* Proceedings of Frontiers
in Education, Worldcomp'06, June 26-29, 2006.

3. Wigal, Cecelia M., Neslihan Alp, Claire McCullough, Stephanie Smullen, and Kathy Winters*, ACES: Introducing Girls to and Building Interest in Engineering and Computer Science Careers*, Proceedings of the Frontiers in Education Conference, November 6-9, 2002, IEEE.

4. *Wigal, Cecelia M., Neslihan Alp, Claire McCullough, Stephanie Smullen, and Kathy Winters, "*ACES: Introducing Girls to and Building Interest in Engineering and Computer Science Careers," Abstract submitted for the Frontiers in Education Conference, November 6-9, 2002.

5. *Winters, Katherine H.*, Laboratory Manual for Computer Literacy, University of Tennessee at Chattanooga, (years
   1999- 2001)

Synergistic Activities
- Apply for National Security Agency (NSA) 4011 and 4012 certificates, certified, 2007-2012.

- Apply for Center of Academic Excellence – Education (CAE-E) from NSA, submitted.

- Serve as Session Chair in ACM Middle Southeast Conference, 2007

- Serve as President of ACM Middle Southeast, 2007 and 2008.

- PGE/SEP: Adventures in Computer, Engineering, and Space (ACES) – NSF Award Number 000385 – $ 99,893-
  1/1/2001-3/31/2003 - (funded).

Collaborators and Other Affiliations

Joseph M. Kizza	Collaborator	University of Tennessee at Chattanooga
Li Yang	Collaborator	University of Tennessee at Chattanooga
Claire McCullough	Collaborator	University of Tennessee at Chattanooga
Cecelia Wigal	Collaborator	University of Tennessee at Chattanooga
Neslie Alp	Collaborator	University of Tennessee at Chattanooga
Phil Kazmersky	Collaborator	University of Tennessee at Chattanooga

Roland Howell

Computer Science, Computer Engr., Math, Teaching

—

Skills

—

Experience

Roland Howell
4145 Watson Rd.
Chattanooga, TN 37415

423-432-4557
roland.howell@gmail.com
roland-howell@utc.edu

Languages: Python, Java, C++, Matlab

Applications: Office, Eclipse, various LMS

Subjects: Comp Sci/Eng, Math, Physics, Engineering

University of Tennessee at Chattanooga / Lecturer
August 2021 - present, Chattanooga, TN

Teach computer engineering courses and labs.

Chattanooga State Community College / Adjunct Instructor
September 2018 - May 2021, Chattanooga, TN

Teach co-requisite learning support (remedial) math both in-class and online.

Chattanooga State Community College / Math Lab Manager
September 2018 - August 2021, Chattanooga, TN

Manage math tutoring and testing lab and tutors. Recruiting, training, scheduling, budgeting, and interfacing with faculty. Assisting with students when needed.

University of Tennessee at Chattanooga / Graduate Assistant
August 2017 - April 2018, Chattanooga, TN

Led lab sessions and graded homework/labs/quizzes for CPEN 3700. Set up and secured lab equipment. Helped students troubleshoot problems.

Chattanooga State Community College / Tutor
March 2013 - August 2018, Chattanooga, TN

Tutor students in math from basic arithmetic up through calculus and differential equations. Proctor and supervise math tests.

Education

University of Tennessee at Chattanooga / Master of Science in Computer Science (Data Science)

August 2017 - May 2020, Chattanooga, TN

Graduated with GPA of 4.00

University of Tennessee at Chattanooga / Bachelor of Science in Engineering (Computer Engineering)

August 2013 - December 2015, Chattanooga, TN

Graduated Summa Cum Laude with GPA of 3.96

Awards

Outstanding Master's Student -UTC 2019.

Summa Cum Laude -UTC 2015.

Outstanding Senior Award -UTC 2015.

Tau Beta Pi Engineering Honor Society -UTC 2015.

References

Ed Nichols
Department Head, Mathematics
Chattanooga State Community College
423-697-3350
edward.nichols@chattanoogastate.edu

Angelina Blevins
Math Center Manager
Chattanooga State Community College
423-697-4711
angelina.blevins@chattanoogastate.edu

Joe Dumas
UC Foundation Professor
University of Tennessee at Chattanooga
423-425-4084
Joe-Dumas@utc.edu

Appendix G. Undergraduate Syllabi Examples

Survey of Programming Languages

Spring 2020

CPSC 4100, CRN: 20876; face-to-face; 3 credit hours

Instructor: Craig Tanis, PhD

Email and Phone Number: craig-tanis@utc.edu; 423-425-4384 (email preferred)

Office Hours and Location: EMCS 314b. Hours posted on UTC Learn. Appointments available on request. I will respond to emails within one business day.

Course Meeting Days, Times, and Location: MW 12:00-1:15, EMCS 302

Course Catalog Description: The study of the structure, design, and implementation of computer programming languages, including procedural, object-oriented, logic programming, and functional languages. Topics include language syntax and semantics, procedure and data abstraction, binding times, exception processing, support for concurrency, and language programming paradigms.

Course Pre/Co Requisites: Prerequisites: CPSC 2800 and CPSC 3200 with minimum grades of C or department head approval.

Course Student Learning Outcomes: This course is a survey of popular programming languages, illustrating a variety of language design choices and problem-solving approaches. By the end of this semester, you will be able to: • Describe programming languages accurately and succinctly • Quickly learn new languages • Make educated language choices

Course Fees: Differential Course Fee will be assessed.

Required Course Materials: None required; free resources will be distributed as the semester progresses.

Technology Requirements for Course: You will need access to a computer with the appropriate programming tools and libraries installed. These are available in departmental labs in the EMCS building. If you do not have your own computer, you may need a USB thumb drive.

Technology Skills Required for Course: You should be able to navigate UTC Learn. You should be able to check your UTC email.

Technology Support: If you have problems with your UTC email account or with UTC Learn, contact IT Solutions Center at 423-425-4000 or email itsolutions@utc.edu.

Course Assessments and Requirements: Homework assignments: 40%; 2 Exams: 30%; Group Project: 20%; Class participation: 10%

Course Grading

    Course Grading Policy: 90-100%=A; 80-89.999%=B; 70-79.999%=C; 65-69.999%=D; <65%=F. Final grades will not be rounded up.

    Instructor Grading and Feedback Response Time: I will try my best to grade all graded assignments within one week of the due date and provide written feedback when necessary and possible.

Course and Institutional Policies

    Late/Missing Work Policy: All assignments are to be submitted via UTC Learn on or before the assigned due date. If an assignment is not submitted on time, you will have 2 business days to complete the assignment with a 10% penalty. After one week, late assignments may be presented in person for a 40% penalty. Individual assignments may have a different late policy. This will be made clear at the time the assignment is given. Missed exams and presentations will only be made available for retaking with prior approval or a doctor's note.

        Student Conduct Policy: UTC's Academic Integrity Policy is stated in the [Student Handbook](#).

        Honor Code Pledge: I pledge that I will neither give nor receive unauthorized aid on any test or assignment. I understand that plagiarism constitutes a serious instance of unauthorized aid. I further pledge that I exert every effort to ensure that the Honor Code is upheld by others and that I will actively support the establishment and continuance of a campus-wide climate of honor and integrity.

        Course Attendance Policy: You are expected to attend all class sessions. I calculate a "class participation" component of your final grade based on attendance and involvement in class activities.

Course Participation/Contribution: Lecture, homework assignments, group projects in-class and out.

Course Learning Evaluation: Course evaluations are an important part of our efforts to continuously improve the learning experience at UTC. Toward the end of the semester, you will receive a link to evaluations and you are expected to complete them. We value your feedback and appreciate you taking time to complete the anonymous evaluations.

Academic Integrity: The Honor System is designed foster a campus-wide climate of honesty and integrity in order to insure that students derive the maximum possible benefit from their work at the University of Tennessee at Chattanooga. The student becomes subject to the rules

and regulations of the UTC Honor Code (see above) upon registration. Each student is obligated to exert every effort to insure that the Honor Code is upheld by himself/herself and others. An incidence of academic dishonesty such as cheating or plagiarism will be addressed according to the UTC Honor Code violation procedure. Please see the UTC Student Handbook for further information.

My interpretation: **make sure you are doing your own work!**

In particular, the following activities may result in a referral to the UTC Honor Court:

- Submitting code you did not write, such as from the internet or another student.
- Providing code for programming assignments to other students

I hold both cheaters and the enablers of cheaters equally responsible. If you have any questions about whether an action is appropriate, please ask me.

Etiquette: Phones should remain silent and stowed during class periods. Food is not allowed in the lecture or labs.

Course Calendar/Schedule:

Topic 1: C/C++

Topic 2: Lisp / Scheme

Midterm Exam: 2/26/20

Topic 3: Scripting

Topic 4: Concurrency / Erlang

Topic 5: Prolog

Group Projects Due: 4/15/20

Final Exam: 4/22/20 10:30am – 12:30pm

Programming Languages for Advanced Data Analytics

Fall 2021

Department of Computer Science and Engineering

CPSC4180/5180 CRN 42589/42590
BIOL 4999R/5010, CRN 43510/43555

Online, synchronous, 3 credit hours

Instructor: Hong Qin

Email and Phone Number: hong-qin@utc.edu 423-426-4329

Office Hours and Location: As posted at UTCLearn or appointments with the instructor

Course Meeting Days, Times, and Location: Monday and Wednesday 6pm – 7:15pm
ECS 312 or Online

Course Catalog Description: This course introduces students to the fundamental computing skills necessary for effective data analysis. Through this course students will learn a business/statistical programming language to read data, write functions, make informative graphics, and apply modern statistical methods to complex data sets. The course is designed to be of interest to students in a range of disciplines including health, insurance, education, sport and management.

Course Pre/Co Requisites: Department approval.

Course Student Learning Outcomes: Students will be able to use large amounts of data to identify trends via paring, sorting, aggregating, indexing, and making data connections. Students will be able understand different types of data, including where, how, and why data is stored in certain manners and how data is retried based on the data source. Students will be able to interface with data in a logical and efficient manner. Students will be able to process and identify discrepancies within large data sets. Students will be able to perform advanced data analysis such as machine learning, interpreted the results, and present the results.

Course Fees: *Differential fee of College of Engineering and Computer Science will be applied.*

Required Course Materials: No required textbook

Recommended textbook:
R for data science at https://github.com/hadley/r4ds and https://r4ds.had.co.nz/
Introduction to Statistical Learning with application in R: https://www.statlearning.com/
Python for Data Analysis, Wes McKinney, https://github.com/wesm/pydata-book
Linear Models with Python, Julian Faraway, https://julianfaraway.github.io/LMP/

Supplemental/Optional Course Materials: Many online materials will be provided by the instructor.

Technology Requirements for Course: Students will need internet access and computers to attend lectures and complete homework and exams.

Technology Skills Required for Course: Click here to enter text.

Students are expected to have working knowledge of computer usage, internet search engines, Microsoft Word, Microsoft PowerPoint, and YouTube to complete course requirements. Students are expected to learn to take screen-shots and/or screen-cast of your activities on your computer. Students are expected to check course pages at UTCLearn regularly for course information, assignment and exams.

Students need access to a computer with a reliable internet connection to complete online assignments and exams. Test your computer set up and browser for compatibility with UTC Learn at http://www.utc.edu/learn/getting-help/system-requirements.php.

Jupyter-notebooks are required for most assignments, coding problems, and exams. The instructor recommends *Anaconda,* Google *Co-Lab*, or *Google Could Platform* for coding in Jupyter notebooks.

Campus Safety Policy: Due to COVID-19, there is a campus safety policy (https://www.utc.edu/walker-center-teaching-learning/covid-19-safety-policy.php) for classes that meet on campus; please review this policy.

Technology Support: If you have problems with your UTC email account or with UTC Learn (Canvas), contact IT Help Desk at 423-425-4000 or email helpdesk@utc.edu.

Student Technology: If you have technology needs to access your courses and/or complete course requirements in Canvas, submit a request (https://new.utc.edu/information-technology/learning-from-home) with Information Technology.

Student Accommodations: If you have accessibility and accommodation requests, contact the Disability Resource Center (https://www.utc.edu/disability-resource-center/index.php) at 423-425-4006 or email DRC@utc.edu.

Course Assessments and Requirements: Click here to enter text.

Coding exercises, homework assignments, and exams will be used to assess student learning outcomes. Students are expected to check UTCLearn regularly for due dates of assignments and exams, and complete them on-time.

Impromptu quizzes will be given in class to assess student learnings and mastering of skills on topics from previous classes.

Participatory Coding and Usage of Video and Audio Recordings

- Educational research show that **participatory coding** is one of the most effective way of learning programming. All students are expected to actively participated in the coding practices.

- Students will be required to **screen-cast their coding exercises**. The rationale of this requirement is to not only ensure that all students are doing their own work, but also help students practice communication skills, learn to explain their own thoughts and present their own work, and be prepared to present themselves for future job markets. Screen-casts can also help instructors and teaching-assistants offer meaningful advices to students.

- Communication skill is part of SACS assessment. Example of past student video presentations will be provided.

- Dr. Qin will lead by example. He will routinely record lectures, often through screen-cast, during classes and labs. These recordings will be made available through UTCLearn for students.

SACS Assessment

	Outcome	Performance Indicators
A	Apply knowledge	Ability to apply knowledge of computing and mathematics appropriate to the discipline
B	Analyze and Solve problems	Ability to analyze and solve a problem or system through designing, implementing, and/or evaluating a computer-based system, process, component, to its solution
C	Communicate effectively	Ability to communicate effectively in a variety of professional contexts.
D	Use current techniques, skills, and tools	Ability to use current technique, skills, and tools necessary for computing practice.
E	Apply mathematical foundation	Ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.

Course Grading

Course Grading Policy: 90-100% = A; 80-89% = B; 70-79% = C, 60-69% = D; <60% = F. Final grades will be rounded precisely. If you have an 89.4% final average, this is a B. If you have a 69.5%, this is a C.

Grade will be calculated as follows:

Activities/ Evaluation Methods	Percentages (subject to change if needed)
Assignments	40%
Midterm project	20%
Final project and report	30%
Final presentation	10%
Total	100%

Instructor Grading and Feedback Response Time: Instructors and TAs will respond within one-week after the deadline.

Course and Institutional Policies

Late/Missing Work Policy: Missing work will receive zero points. Late assignments will receive 5% reduced points per day. If you are ill or an emergency arises, it is your responsibility to notify the instructor *prior* to exam time or as soon as possible. Instructor will not deem any claims about computer malfunctioning or network connection problems as legitimate reasons for makeup assignments or exams

Student Conduct Policy: UTC's Student Code of Conduct and Honor Code (Academic Integrity Policy) can be found on the Student Conduct Policy page (https://www.utc.edu/student-conduct/codes.php).

Honor Code Pledge: As a student of the University of Tennessee at Chattanooga, I pledge that I will not give or receive any unauthorized assistance with academic work or engage in any academic dishonesty in order to gain an academic advantage. I will exert every effort to insure that the Honor Code is upheld by myself and others, affirming my commitment to a campus-wide climate of honesty and integrity

Course Attendance Policy: *Attendance and participation are required. There will be no make-ups for missed in-class quizzes and exams.*

Course Participation/Contribution: Click here to enter text.

- Class participation will be recorded through https://www.socrative.com/. Room name is "HongQin".

- Students are responsible for all material covered and homework assignments during their absence.

- Students are responsible for obtaining all handouts, assignments, etc. distributed during their absence.

- 0-tolerance about disruptive behavior (i.e., texting, chatting, cell phone, web-surfing)
- 0-tolerance about copy-and-paste of lab and homework assignment
- Students are encouraged to work as a team for homework assignments (but not for exams unless indicated by the instructor otherwise). All submitted work should be done individually. The screen-recording requirement is to ensure that every student did their own work even if they worked in a team environment.

Course Learning Evaluation: Course evaluations are an important part of our efforts to continuously improve learning experiences at UTC. Toward the end of the semester, you will be emailed links to course evaluations and you are expected to complete them. We value your feedback and appreciate you taking time to complete the anonymous evaluations.

UTC Bookstore: The UTC Bookstore will price match Amazon and Barnes and Noble (https://www.barnesandnoble.com/) prices of the exact textbook - same edition, ISBN, new to new format, used to used format, and used rental to used rental format, with the same rental term.   For more information, go to the Bookstore Price Match Program (https://bnc.pgtb.me/MMt77F), visit the bookstore, email sm430@bncollege.com or call 423-425-2184.

COVID Absences (updated on August 6, 2021)

Students **must complete the** COVID-19 Notification form if they are positive for COVID-19; symptomatic for COVID-19; exposed (close contact) to a known case of COVID-19 / someone positive for COVID-19; or potentially exposed to a known case of COVID-19 / someone positive for COVID-19. Documentation will be provided to the instructor by the Office of Student Outreach & Support.

Students who are instructed by university administration to stay home due to their responses are not to come to campus or attend face-to-face classes. Students who are cleared to be on campus and attend class are required to attend face-to-face class sessions. Students will not be penalized for COVID-19 related absences or late course assessments due to a COVID-19 related concerns unless they are unable to complete course learning outcomes. Faculty will work reasonably with students to identify ways to complete course requirements.

Students must, if they are asymptomatic or if their symptoms do not interfere with their ability to participate in the course, **continue to participate in the course using the online assets and**

tools that the instructor may make available through UTCLearn including: video lectures, reading materials, and assignments.

If COVID-19 related illness results in any missed course work (face-to-face or online), **students must contact the instructor within 48 hours of recovering to plan make-up work.** Makeup work must be completed according to the plan devised by the instructor in coordination with the student. It remains the student's responsibility to complete any missed work such as assignments, tests, quizzes, labs, or projects outside of scheduled class time. But please realize that class will continue, and students may find themselves in the situation where they are unable to complete all work by the end of the semester. In such a case, students should consider a late withdrawal or an incomplete grade. Please contact the Records Office (423-425-4416) to learn more about the late withdrawal process.

If students have COVID-19 disability related risk factors that may affect attendance, students are strongly encouraged to register with the Disability Resource Center (423-425-4006) in order to receive necessary accommodations.

If students believe the instructor has not made reasonable and appropriate accommodations for absences, or makeup assignments, projects, labs, or exams due to COVID-19, students have the right to appeal according to UTC's General Student Grievance (Complaint) Procedure by filling out the Student Complaint Form and submitting to the Office of the Dean of Students.

Course Calendar/Schedule: Click here to enter text.

	WK1	Course overview, DataCamp, Git and GitHub
R	WK2	R basics and programming
	WK3	Data wrangling with R
	WK4	Data analysis with R
	WK5	Advanced data analysis with R
	WK6	Midterm: take-home R coding exam
Python	WK7	Python overview, NumPy
	WK8	Pandas
	WK9	Data loading, storage, file format in Python
	WK10	Data wrangling with Python
	WK11	Plotting and visualization with Python
Projects	WK12	Case studies and course projects
	WK13	Review and discussion recent data analysis techniques
	WK14	Discussion of course projects
	WK15	Final project report and video presentation

This syllabus is subject to change with notification on UTC Learn, email, or other written notification.

Computer Architecture

Fall 2022

CPEN 4700-0, CRN 45298, synchronous online course, 3 credit hours

Instructor: Dr. Joe Dumas

E-mail and Phone Number: Joe-Dumas@utc.edu, (423) 425-4084. On days when classes are in session, you can expect e-mails to be answered within 24 hours. Response time may be longer over weekends and holidays, or if I am traveling out of town (*e.g.* to a conference). If you need immediate assistance and I am not in my office, please contact CSE administrative specialist Ms. Eva Hunter at (423) 425-4349 or Eva-Hunter@utc.edu.

Office Hours and Location: EMCS 313C – office hours will be posted on my office door. If you would like to make an appointment for a specific time, please e-mail me with possible dates/times you could meet. If you are unable to come to my office in person, please e-mail me to set up a Zoom meeting.

Course Meeting Days, Times, and Location: 12:15 to 1:30 p.m. Tuesday/Thursday, via Zoom. Zoom sessions will be archived in Canvas and available for viewing asynchronously. ***Tests and the final exam will be administered online during the scheduled class meeting times (synchronously).***

Course Catalog Description: An advanced course in computer architecture. Topics include classical uniprocessor architecture, computer arithmetic, instruction sets, control unit design including the basics of microprogramming, I/O operations, memory hierarchies, cache and virtual memory mechanisms, instruction and arithmetic pipelines, CISC, RISC, superscalar and superpipelined architectures, parallel architectures.

Course Pre/Co Requisites: Prerequisites are *CPSC 2800 and CPEN 3700 with grades of C or better.* If you have any doubts regarding your preparation to take this course, please discuss your situation with me as soon as possible.

Course Student Learning Outcomes: This course will amplify and expand upon the fundamentals of computer system organization and architecture covered in CPEN 3700 (and 3710, for students who have taken that class). Students will learn about the history and evolution of computer architectures and will become conversant with many of the terms and concepts used in the field of modern computer system design. Topics of particular interest will include von Neumann and non-von Neumann architectures, performance measures, data representations and instruction sets, control unit design, RISC and CISC machines, parallel processing, pipelining, I/O techniques, cache memory, and memory management systems.

Course Fees: CECS Differential Course Fee applies to this course.

Required Course Materials: Textbook: Dumas, Joseph D. II. *Computer Architecture: Fundamentals and Principles of Computer Design*, Second Edition, CRC/Taylor & Francis, 2017. ISBN 978-1-4987-7271-6.

Free Textbook Access: Thanks to UTC Library's *Affordable Course Materials Initiative*, the required textbook is available to currently enrolled students *free of charge*. You can access an electronic version of the textbook (to either read it online or download a PDF file) by going to the following link: https://doi-org.proxy.lib.utc.edu/10.4324/9781315367118. You will have to authenticate as a UTC student by logging in with your UTCID and password. If you would like a printed copy of the textbook, they are available for purchase from the UTC Bookstore.

Supplemental/Optional Course Materials: Supplemental materials, if needed, may be provided via UTC Learn.

Technology Requirements for Course: Students will need a computer with a web browser that is compatible with UTC Learn (Canvas) in order to access assignments. If you are not sure whether your browser is supported, please visit the following link:

https://community.canvaslms.com/docs/DOC-10720-67952720329

The final project report will require students to use a word processor (*e.g.,* Microsoft Word) and produce a PDF file. Students may do this on their own, personal computers or in any of the CSE department labs (EMCS 220, 306, 312, 321) when they are not in use by another class.

Technology Skills Required for Course: Students must be able to navigate the UTC Learn site using a web browser in order to access the final project assignment and other course information, and to take tests and the final exam. Students also need to be able to use a word processor to create and save files, and must possess basic file manipulation skills in a Windows environment. Students need to be familiar with Boolean algebra, binary and hexadecimal arithmetic, logic gates, and other basic digital logic circuits introduced in CPEN 3700.

Technology Support: If you have problems with your UTC e-mail account or with UTC Learn, contact the IT Solutions Center at 423-425-4000 or e-mail helpdesk@utc.edu.

Student Technology: If you have technology needs to access your courses and/or complete course requirements in Canvas, submit a request (https://www.utc.edu/information-technology/technology-resources-for-students) with Information Technology.

Student Accommodations: If you have accessibility and accommodation requests, contact the Disability Resource Center (https://www.utc.edu/enrollment-management-and-student-affairs/disability-resource-center) at 423-425-4006 or e-mail DRC@utc.edu.

Course Assessments and Requirements: Grades will be based on your performance on three in-class tests, a comprehensive final examination, and a final project which may consist of a research paper on an assigned topic and/or an investigation of some topic related to the course material. (The project will also require a presentation; specific requirements will be covered in a separate handout.) Your numerical average for the course will be based on the following weighting: Test 1, 20%; Test 2, 20%; Test 3, 20%; Final Exam, 25%; Final Project, 15%.

Course Grading

Course Grading Policy: Letter grades for the course will be assigned on the following scale: 90.00 or higher, A; 80.00 - 89.99, B; 70.00 - 79.99, C; 60.00 – 69.99, D; less than 60.00, F. Note that CPEN 4700 is a core course which must be passed with a grade of C or better in order to graduate with a degree in Computer Engineering or Computer Science, or to take any other courses which require it as a prerequisite. Thus, students who earn any grade below C will need to repeat the class.

Instructor Grading and Feedback Response Time: Tests will be graded and returned as soon as possible, usually by the next class meeting, although turnaround time may be a week or more at busy times of the semester. The final project reports/presentations will be graded only after all groups have completed their presentations. If you would like a scanned copy of your group's graded project, you may request it via e-mail. When papers are returned to you, review them carefully. If you detect an error in scoring or have any other questions, contact me as soon as possible. **I will not adjust scores any later than one week after the graded item in question has been returned to you.**

Course and Institutional Policies

Late/Missing Work Policy: No make-up exams will be given without a documented excuse for an approved reason. The final exam score will be counted in place of the lowest of the three test scores if it helps your grade. If you miss one of the tests for any reason, your score for that test will be recorded as zero and your final exam score will be used in place of that test. Scores for a second or third missed test will be assigned at the instructor's discretion, with a default value of zero if the absence(s) are unexcused. **You are responsible for submitting the final project assignment on time.** *Late final projects will be penalized severely if they are accepted at all.*

Student Conduct Policy: UTC's Student Code of Conduct and Honor Code (Academic Integrity Policy) can be found on the [Student Conduct Policy page](https://www.utc.edu/enrollment-management-and-student-affairs/student-conduct/codes) (https://www.utc.edu/enrollment-management-and-student-affairs/student-conduct/codes).

Honor Code Pledge: "As a student of the University of Tennessee at Chattanooga, I pledge that I will not give or receive any unauthorized assistance with academic work or engage in any academic dishonesty in order to gain an academic advantage. I will exert every effort to

insure that the Honor Code is upheld by myself and others, affirming my commitment to a campus-wide climate of honesty and integrity."

Individual Work Policy: <mark>**All work**</mark> on tests and the final exam is to be done on a <mark>**strictly individual basis**</mark>. (The final project will be assigned as a group project, and in that case you will be expected to work exclusively with your fellow group members and to properly cite all external sources of information.) **Electronically administered tests and the final exam are to be completed on your own,** *without* **consulting any other person or resource (hard copy or online). Important: Cheating of any kind on a test or exam, or plagiarism in a research report, will result in a grade of F for the course for the** *first offense***.** In addition to the above penalties, any student who is involved in an act(s) of academic dishonesty may be reported to the Honor Court for possible further action; penalties may include academic probation, suspension, or dismissal from UTC.

Course Attendance Policy: Students are expected to attend class (online) regularly and to contact the instructor as soon as possible in the event they miss class so that they may be informed of material covered, schedule changes, upcoming tests, etc. Zoom sessions will be recorded and posted to UTC Learn for later review. **Tests and the final exam will be given** *synchronously* **and students are expected to complete them during the assigned time slot unless the instructor has been provided an officially approved excuse (***e.g.,* **doctor's instructions).** Students are also advised to check their UTC e-mail and UTC Learn (Canvas) regularly for information and announcements. There is no point penalty assigned for cutting class; however, the student is responsible for all material covered and all test/project due dates.

Course Participation/Contribution: Students are expected to read the assigned sections in the textbook, pay attention in class, and ask questions (in Zoom or via e-mail) about any aspect of the material they do not understand.

Course Learning Evaluation: Course evaluations are an important part of our efforts to continuously improve learning experiences at UTC. Toward the end of the semester, you will be e-mailed links to course evaluations and you are expected to complete them. We value your feedback and appreciate you taking time to complete the anonymous evaluations.

Course Calendar/Schedule: A detailed schedule for the course, showing all test dates and assignment due dates, is posted in UTC Learn. A summary of other important dates follows: Classes begin – Monday, August 22; last day to register – Sunday, August 28; last day to drop without a "W" – Sunday, September 4; mid-term grades given out – October 3-14; fall break – October 15-18; last day to drop with a "W" – Monday, October 31; Thanksgiving holiday – November 23-27; last day of classes – Monday, December 5; Reading Day – Tuesday, December 6; final exam for this course – Thursday, December 8 (10:30 a.m. – 12:30 p.m.).

Appendix H. Graduate Syllabi Examples

Theory of Computer Programming Languages

Fall 2022

CPSC 5100, CRN 40487, online, 3 credit hours

Instructor: Dr. Dalei Wu

Email and Phone Number: dalei-wu@utc.edu   423-425-4386

Office Hours and Location: Monday 10am – 2pm, Wednesday 12pm – 2pm, Friday 10am – 2pm, CECS Building, Room 315C; or online over zoom by email appointment.

Course Meeting Days, Times, and Location: Asynchronous online, logging into UTC Canvas to access course content.

Course Catalog Description: Theory and design of computer language systems including the formal theory of syntax, semantics of algorithmic languages, language classification, and a survey of procedure and problem-oriented computer programming languages.

Course Pre/Co Requisites: CPSC 5000 or placement, or department head approval.

Course Student Learning Outcomes: Students will learn about the principles of diverse programming languages and become conversant with many of the terms and concepts used in the field of programming languages. After completion of this course students are expected to:

- Demonstrate an ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices
- Describe formal syntax models and identify the role they play in programming languages
- Describe ways in which programming language semantics can be specified
- Identify the fundamental elements common to all programming languages
- Identify and describe language categories
- Identify and describe imperative programming languages
- Identify and describe functional programming languages
- Identify and describe object-oriented programming languages
- Identify and describe logic programming languages
- Write simple programs in several programming languages including ML, Java, Prolog, Fortran, Cobol, and Ruby

Course Fees: Differential Course Fee will be assessed.

Required Course Materials:
- *Modern Programming Language*, A Practical Introduction, Second Edition, by Adams Brooks Webber, Franklin, Beedle & Associates Incorporated, 2011.

Supplemental/Optional Course Materials:
- *Concepts of Programming Languages*, 12th Edition, by Robert W. Sebesta, Pearson, 2018.

Technology Requirements for Course: You need access to a computer with a reliable internet connection to complete this course. Test your computer set up and browser for compatibility with UTC Canvas at https://community.canvaslms.com/docs/DOC-10721. You should also have an updated version of Microsoft Office and Adobe Acrobat Reader, available free from https://webapps.utk.edu/oit/softwaredistribution/, https://get.adobe.com/reader/.

Technology Skills Required for Course: These include using Standard ML of New Jersey, Eclipse IDE for Java, Java JDK, Prolog, Ruby, using the learning management system (UTC Canvas), using MOCSNet email, creating, zipping, and submitting files to UTC Canvas, copying and pasting, and downloading and installing software.

Course Assessments and Requirements:
- Student learning outcomes will be evaluated through assignments, a project, a midterm test, and a final test.
- The final project may consist of a research paper on an assigned topic and/or an investigation of some topic related to the course material. (Details will be covered in a separate handout.)

- Individual extra credit assignments for the purpose of propping up a bad grade will not be given.
- You will work on the assignments individually, unless otherwise stated. Any students submitting assignments showing evidence of inappropriate collaboration will receive a warning and a zero for the first offence. Both the giver and receiver of the help will be penalized. Subsequent violations will be treated as an honor code violation and may result in failure in the class.

Course Grading

Course Grading Policy: 90+ = A; 80-89 = B; 70-79 = C; 60-69 = D; below 60 = F

Assignments	40%
Project	10%
Midterm test	20%
Final test	30%

Instructor Grading and Feedback Response Time: Grading and feedback by the instructor will be completed within two weeks of the posted deadline.

Course and Institutional Policies

Late/Missing Work Policy:
- You are responsible for all material covered during your absence.

- You are responsible for obtaining all handouts, assignments, etc. distributed during your absence.

- Homework and assignments should be turned in on time when they are due. Prior notice and explanation are needed for late work to get graded.

- Makeup exams will not be given except for applicable situations that would need to be further examined.

Course Participation/Contribution: Reading, assignments, project, exams, Q&A in office or online by email appointment.

Course Calendar/Schedule:

Midterm: Friday, October 7 (online)
Final: Friday-Saturday, December 9-10 (online)

Time	Content/Topics
Week 1 (08/22-08/26)	Chapter 1 introduction, programming languages
Week 2 (08/29-09/02)	Chapter 2 programming language syntax
Week 3 (09/05-09/09)	Chapter 3 syntax vs. semantics
Week 4 (09/12-09/16)	Chapters 4&5 language systems, the classical sequence, binding times, ML basics
Week 5 (09/19-09/23)	Chapters 6&7 types, ML patterns and pattern-matching style
Week 6 (09/26-09/30)	Chapters 8&9 polymorphism, ML functions
Week 7 (10/03-10/07)	Midterm Review & Exam
Week 8 (10/10-10/14)	Chapters 10&11 scope, ML type constructors
Week 9 (10/17-10/21)	Chapters 12&13 memory locations for variables, class & objects
Week 10 (10/24-10/28)	Chapters 14&15 memory management, Java polymorphism
Week 11 (10/31-11/04)	Chapters 16&17 object orientation, exception and error handling
Week 12 (11/07-11/11)	Chapters 18&19 parameters, Prolog basics
Week 13 (11/14-11/18)	Chapters 20&21&22 Prolog, cost models
Week 14 (11/21-11/25)	Final project, Thanksgiving Break (no classes)
Week 15 (11/28-12/02)	Final project, review
Week 16 (12/05-12/09)	Final

Programming Languages for Advanced Data Analytics

Fall 2022

Department of Computer Science and Engineering

CPSC 5180 CRN 42590
In-person, 3 credit hours

Instructor: Hong Qin

Email and Phone Number: hong-qin@utc.edu 423-426-4329

Office Hours and Location: As posted at UTC Learn or appointments with the instructor

Course Meeting Days, Times, and Location: Monday and Wednesday 6pm – 7:15pm
ECS 312

Course Catalog Description: This course introduces students to the fundamental computing skills necessary for effective data analysis. Through this course students will learn a business/statistical programming language to read data, write functions, make informative graphics, and apply modern statistical methods to complex data sets. The course is designed to be of interest to students in a range of disciplines including health, insurance, education, sport and management.

Course Pre/Co Requisites: Department approval.

Course Student Learning Outcomes: Students will be able to use both R and Python and use large amounts of data to identify trends via paring, sorting, aggregating, indexing, and making data connections. Students will be able understand different types of data, including where, how, and why data is stored in certain manners and how data is retried based on the data source. Students will be able to interface with data in a logical and efficient manner. Students will be able to process and identify discrepancies within large data sets. Students will be able to perform advanced data analysis such as machine learning, interpreted the results, and present the results.

Course Fees: *Differential fee of College of Engineering and Computer Science will be applied.*

Required Course Materials: No required textbook

Recommended textbook:
R for data science at https://github.com/hadley/r4ds and https://r4ds.had.co.nz/
Introduction to Statistical Learning with application in R: https://www.statlearning.com/
Python for Data Analysis, Wes McKinney, https://github.com/wesm/pydata-book
Linear Models with Python, Julian Faraway, https://julianfaraway.github.io/LMP/

Supplemental/Optional Course Materials: Many online materials will be provided by the instructor.

Technology Requirements for Course: Students will need internet access and computers to attend lectures and complete homework and exams.

Technology Skills Required for Course: Click here to enter text.

Students are expected to have working knowledge of computer usage, internet search engines, Microsoft Word, Microsoft PowerPoint, and YouTube to complete course requirements. Students are expected to learn to take screen-shots and/or screen-cast of your activities on your computer. Students are expected to check course pages at UTC Learn regularly for course information, assignment and exams.

Students need access to a computer with a reliable internet connection to complete online assignments and exams. Test your computer set up and browser for compatibility with UTC Learn at http://www.utc.edu/learn/getting-help/system-requirements.php.

Jupyter-notebooks are required for most assignments, coding problems, and exams. The instructor recommends *Anaconda,* Google *Co-Lab*, or *Google Could Platform* for coding in Jupyter notebooks.

Campus Safety Policy: Due to COVID-19, there is a campus safety policy (https://www.utc.edu/walker-center-teaching-learning/covid-19-safety-policy.php) for classes that meet on campus; please review this policy.

Technology Support: If you have problems with your UTC email account or with UTC Learn (Canvas), contact IT Help Desk at 423-425-4000 or email helpdesk@utc.edu.

Student Technology: If you have technology needs to access your courses and/or complete course requirements in Canvas, submit a request (https://new.utc.edu/information-technology/learning-from-home) with Information Technology.

Student Accommodations: If you have accessibility and accommodation requests, contact the Disability Resource Center (https://www.utc.edu/disability-resource-center/index.php) at 423-425-4006 or email DRC@utc.edu.

Course Assessments and Requirements: Click here to enter text.

Coding exercises, homework assignments, and exams will be used to assess student learning outcomes. Students are expected to check UTC Learn regularly for due dates of assignments and exams, and complete them on-time.

Impromptu quizzes will be given in class to assess student learnings and mastering of skills on topics from previous classes.

Participatory Coding and Usage of Video and Audio Recordings

- Educational research show that **participatory coding** is one of the most effective way of learning programming. All students are expected to actively participated in the coding practices.

- Students will be required to **screen-cast their coding exercises**. The rationale of this requirement is to not only ensure that all students are doing their own work, but also help students practice communication skills, learn to explain their own thoughts and present their own work, and be prepared to present themselves for future job markets. Screen-casts can also help instructors and teaching-assistants offer meaningful advices to students.

- Communication skill is part of SACS assessment. Example of past student video presentations will be provided.

- Dr. Qin will lead by example. He will routinely record lectures, often through screen-cast, during classes and labs. These recordings will be made available through UTCLearn for students.

SACS Assessment

	Outcome	Performance Indicators
A	Apply knowledge	Ability to apply knowledge of computing and mathematics appropriate to the discipline
B	Analyze and Solve problems	Ability to analyze and solve a problem or system through designing, implementing, and/or evaluating a computer-based system, process, component, to its solution
C	Communicate effectively	Ability to communicate effectively in a variety of professional contexts.
D	Use current techniques, skills, and tools	Ability to use current technique, skills, and tools necessary for computing practice.
E	Apply mathematical foundation	Ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.

Course Grading

Course Grading Policy: 90-100% = A; 80-89% = B; 70-79% = C, 60-69% = D; <60% = F. Final grades will be rounded precisely. If you have an 89.4% final average, this is a B. If you have a 69.5%, this is a C.

Grade will be calculated as follows:

Activities/ Evaluation Methods	Percentages (subject to change if needed)
Assignments	40%
Midterm project	20%
Final project and report	30%
Final presentation	10%
Total	100%

Instructor Grading and Feedback Response Time: Instructors and TAs will respond within one-week after the deadline.

Course and Institutional Policies

Late/Missing Work Policy: Missing work will receive zero points. The TA and Instructor reserve the right to decline late assignments. Student should notice the TA or instructor two-days in-advance about reasonable circumstances that would prevent the student from completing the assignments on time. If late assignments were accepted given reasonable excuses, they would receive 5% reduced points per day. If you are ill or an emergency arises, it is your responsibility to notify the instructor *prior* to exam time or as soon as possible. Instructor will not deem any claims about computer malfunctioning or network connection problems as legitimate reasons for makeup assignments or exams

Student Conduct Policy: UTC's Student Code of Conduct and Honor Code (Academic Integrity Policy) can be found on the [Student Conduct Policy page](https://www.utc.edu/student-conduct/codes.php) (https://www.utc.edu/student-conduct/codes.php).

Honor Code Pledge: As a student of the University of Tennessee at Chattanooga, I pledge that I will not give or receive any unauthorized assistance with academic work or engage in any academic dishonesty in order to gain an academic advantage. I will exert every effort to insure that the Honor Code is upheld by myself and others, affirming my commitment to a campus-wide climate of honesty and integrity

Course Attendance Policy: *Attendance and participation are required. There will be no make-ups for missed in-class quizzes and exams.*

Course Participation/Contribution: Click here to enter text.

- Class participation will be recorded through https://www.socrative.com/. Room name is "HongQin".

- Students are responsible for all material covered and homework assignments during their absence.

- Students are responsible for obtaining all handouts, assignments, etc. distributed during their absence.

- 0-tolerance about disruptive behavior (i.e., texting, chatting, cell phone, web-surfing)
- 0-tolerance about copy-and-paste of lab and homework assignment
- Students are encouraged to work as a team for homework assignments (but not for exams unless indicated by the instructor otherwise). All submitted work should be done individually. The screen-recording requirement is to ensure that every student did their own work even if they worked in a team environment.

Expectations of Course projects: Course projects are expected to be written in IEEE format. Contents of the report should include title, author, introduction, method, results, discussion and conclusions, reference, supported by codes and running results, figures, tables etc. The report should include the basic concept of the topic, its importance, its current states such as research methods and industrial applications, its application in either research or practical settings, and future directions. A minimum number of 3000 words and 2 figures/tables are expected for a passing grade for undergraduates. A minimum number of 5000 words and 4 figures/tables are expected for a passing grade for graduate students.

Course Learning Evaluation: Course evaluations are an important part of our efforts to continuously improve learning experiences at UTC. Toward the end of the semester, you will be emailed links to course evaluations and you are expected to complete them. We value your feedback and appreciate you taking time to complete the anonymous evaluations.

UTC Bookstore: The UTC Bookstore will price match Amazon and Barnes and Noble (https://www.barnesandnoble.com/) prices of the exact textbook - same edition, ISBN, new to new format, used to used format, and used rental to used rental format, with the same rental term. For more information, go to the Bookstore Price Match Program (https://bnc.pgtb.me/MMt77F), visit the bookstore, email sm430@bncollege.com or call 423-425-2184.

Course Calendar/Schedule: Click here to enter text.

	WK1	Course overview, DataCamp, Git and GitHub
R	WK2	R basics and programming
	WK3	Data wrangling with R
	WK4	Data analysis with R
	WK5	Advanced data analysis with R
	WK6	Midterm: take-home R coding exam
Python	WK7	Python overview, NumPy
	WK8	Pandas
	WK9	Data loading, storage, file format in Python
	WK10	Data wrangling with Python
	WK11	Plotting and visualization with Python
Projects	WK12	Case studies and course projects
	WK13	Review and discussion recent data analysis techniques
	WK14	Discussion of course projects
	WK15	Final project report and video presentation

PERSONAL RESPONSIBILITY, ACADEMIC INTEGRITY, AND STUDENT CONDUCT

       A Campus Reset and Personal Responsibility: The campus environment changed significantly in Spring 2020 as UTC moved from predominantly face-to-face instruction to all online instruction as a result of a global pandemic. Our response to the pandemic changed as circumstances related to it changed. Some campus policies were modified or suspended, public health protocols were put into place and underwent modifications, and professors responded with flexibility to help students navigate public health challenges. The current environment does not pose as significant a public health risk as in the previous several semesters, but we are continuing to follow updated and available best practices as UTC moves forward and begins a new academic year.

We want you to be successful at UTC, and a variety of resources are available to help you succeed. Our outstanding faculty members will teach you. Our committed academic and healthcare staff will support you. Many dedicated employees from every division of campus will help to create a positive experience for you. However, if you are an undergraduate student your academic experience at UTC will be very different than your high school or even the UTC experience since Spring 2020. If you are a graduate student your UTC experience will be very different than your undergraduate experience or even your graduate school experience since Spring 2020.

It is important that we begin the new academic year with a set of common understandings.

- Subject to University policy, individual instructors have considerable autonomy over their classes and course syllabi. That autonomy includes, but is not limited to, decisions related to course content and the format, number and weightings of examinations, assignments, and other evaluative tools.

- Many deadlines, including ones for submitting assignments or completing exams or quizzes will be hard deadlines and not flexible ones. Take care to keep track of exam dates and assignment due dates for your classes.

- Many courses will have attendance policies. There are several reasons an instructor may have a course attendance policy. The learning environment may be enhanced by students interacting with one another or the instructor in a class. In some classes, course material may build upon content from previous class sessions, so an absence may put you at a disadvantage in catching up or successfully completing a course. Departments or instructors may also conclude that chronic absenteeism means that you should not be entitled to receive credit in a course. Faculty members can and will set attendance policies as described above.

- Your academic success at UTC will depend, in part, on things other than your academic aptitude. Your success will be determined further by the choices you make about your

time, including class attendance, participation, study habits, and even management of time outside of class. Importantly, you are responsible for the consequences of the choices you make.

- A college experience is more than just classes. Explore extracurricular and co-curricular activities to meet students with whom you share similar interests. You are more likely to have a positive and successful experience at UTC if you actively engaged in campus life.

- There are hundreds of course options at UTC. Explore interesting courses outside your major. There is nothing wrong with enrolling in a class because it sounds fun or interesting. If you are concerned about progress to graduation, an academic advisor can help you choose classes that keep you excited about school and get you ever closer to a degree.

Student Code of Conduct, Honor Code, and Honor Code Pledge:

Student Code of Conduct: The University has established the Student Code of Conduct to maintain a safe learning environment, protect the rights and privileges of members of the University community, provide for orderly conduct of operations, promote a positive relationship between the University and the community, and preserve institutional integrity and property. All UTC students are encouraged to engage in conduct that brings credit to themselves and the University and that ensures graduates are ready to contribute to society as ethical and engaged citizens. You should familiarize yourself with the Student Code of Conduct.

Honor Code: The University has established an Honor Code to foster and maintain a climate of honesty and integrity. The Honor Code gives you and other students primary responsibility for upholding its standards of conduct and is predicated upon the principle that every student should and must recognize and respect the fundamental importance of honesty. You are responsible for conducting yourself in accordance with the rules and regulations of the Honor Code. You are also expected to ensure that others uphold the standards.

The Honor Code applies to all students and all courses. It prohibits any act of academic dishonesty, including without limitation: (1) Cheating; (2) Plagiarism; (3) Falsification, Fabrication, or Misrepresentation; (4) Use of Unauthorized Materials; (5) Use of Unauthorized Assistance; (6) Gaining Unfair Advantage; (7) Causing Unfair Disadvantage; and (8) Attempting or Assisting a Violation. You should review the UTC Honor Code.

Honor Code Pledge: You will be expected to uphold the Honor Code and to ensure that it is upheld by others. Those expectations are communicated succinctly in the Honor Code Pledge.

Other Academic Integrity Resources: The Canvas learning management system (also called UTC Learn) includes a plagiarism detection tool used by many instructors. Ask your instructors to make the detection tool available so that you may check your written work before submitting it, so you can correct any unintended violations.

Some instructors utilize electronic proctoring of online exams and other records of activity to monitor for integrity violations. Ask your instructor whether electronic monitoring will be used in your online course(s).

ACADEMIC SUPPORT RESOURCES

Library: The UTC Library provides you access to books, movies, articles, and more, both online and physically. It also offers academic supports (*e.g*., reservable study spaces, equipment checkout, a studio for creative projects, a writing center, and on-site computers, printers, and copiers) to assist students with course assignments.

Writing and Communication Center (WCC): For a guaranteed consultation, you may make an appointment by visiting the front desk, calling 423-425-1774, or making an appointment online.

Studio: The UTC Library Studio (3rd Floor) is a workspace for innovative technology and media creation. It includes 16 workstations loaded with specialized software to assist with creative projects. The Studio also has talented faculty and staff to help you get started regardless of your experience level.

Students with Disabilities, Illnesses, or Injuries: UTC is committed to providing an accessible learning environment. If you anticipate or experience a barrier in a course due to a permanent or temporary physical or mental health-related disability, you should contact the UTC Disability Resource Center (DRC) via email or by calling 423-425-4006. A DRC staff member will discuss your needs and next steps, including communication with your instructors. *Appropriate medical documentation will be required and should be provided to the DRC staff and not to your instructors.* The DRC will engage in an interactive process with you and your instructors to help find reasonable accommodations that will assist with mitigating or overcoming disability-related barriers.

Please note that common temporary illnesses (e.g., cold, flu, strep throat, etc.), in most instances, do not qualify as disabilities that require accommodations under the law. You should consult with your instructors regarding their class attendance and excused absence policies.

Course Modality: The Course Schedule lists the modality in which a course, or section of a course, is being offered (e.g., in-person, online, or hybrid). Subject to University policy, the course modalities listed in the Course Schedule for your courses will not be altered or modified.

Accessibility to Courses and Course Materials http://www.utc.edu/drc UTC will make course materials (*e.g.*, handouts and readings) accessible when reasonably possible.

Tutoring and Advising: Center for Academic Support and Advising (CASA) advises freshmen and students who have not declared a major. CASA also supports all students through

several tutoring and peer-mentoring programs. Contact CASA at 423-425-4583 or simply come to UTC Library, Room 335 for assistance.

Technology: If you have problems with your UTC email account or with UTC Learn (the Canvas learning management system), contact IT Help Desk at 423-425-4000, email, or submit a ticket. If you have technology needs to access your courses and/or complete course requirements in Canvas, submit a request with Information Technology.

UTC Email and Communication: To enhance student services, UTC uses UTC email addresses for all communications. You must know how to use your UTC email and should check it daily for timely receipt of class announcements and other important information. If you have difficulties accessing your account or UTC Learn, contact the Solutions Center at 423-425-4000.

UTC Bookstore: The UTC Bookstore will price match Amazon, bn.com, and local competitors for the exact textbook—same edition, format, and rental term.

Course Learning Evaluations and Assessment: Faculty members, students, and administrators have a collective responsibility to continuously improve teaching, learning, and course design. You may be asked to assess qualities of learning in your courses during or at the end of the term. The constructive feedback you provide through our anonymous course assessments helps us provide the highest quality education possible.

STUDENT HEALTH AND WELLNESS

University Health Services (UHS): UHS provides health care to UTC students, faculty, and staff. Services include treatment for acute and chronic illnesses, physical exams, screenings, immunizations, lab services, TB skin testing, and allergy shots.

UTC Counseling Center (UTCCC): UTCCC promotes campus health and wellness through brief, solution-focused therapeutic interventions aimed at enhancing mental health, interpersonal relationships, and student success. It offers counseling for issues including, but not limited to, depression, anxiety, adjustment issues, relationship problems, crisis intervention, and trauma. The Counseling Center offers both in-person and telehealth appointments.

Please contact 423-425-4438, email, or visit the Counseling Center in the 338 University Center to schedule an appointment with a counselor. Crisis services are available 24/7. Please contact 423-425-CARE (2273) if you are experiencing a mental health crisis. For emergencies after hours, contact 423-425-CARE (2273) or call 911.

Aquatic and Campus Recreation Center (ARC): The ARC is an inclusive community environment in which to connect, play and pursue holistic well-being. Facilities and activities include group fitness studios, spin room, climbing tower, exercise equipment, multi-sport courts, natatorium, indoor track, outdoor programs, club sports, and more.

Center for Well-Being: The center promotes healthier, well-balanced lifestyles. It can provide you with the tools, knowledge, and community to help you develop coping skills, recognize warning signs, practice self-care, and learn skills for helping others. Wellbeing focus areas include mental health awareness, substance use education and prevention, physical health, sexual health, and nutrition.

Office of Student Outreach and Support (SOS): The Office of Student Outreach & Support advocates and supports students experiencing challenges in their personal and academic lives. SOS staff can help you navigate University administrative processes; connect with University and community resources; and develop resiliency, self-advocacy, and coping skills. Referrals can be made by made by students, faculty, staff, or individuals outside of the UTC community. To make a referral, you should submit a Community Member of Concern Form. For support or assistance, call (423) 425-2299 or email.

Scrappy's Cupboard: If you are experiencing food, financial, housing, or other insecurity, including difficulty affording meals, groceries, hygiene products, or clothing, you can access Scrappy's Cupboard for support. Scrappy's Cupboard is anonymous and free. For assistance, email or call the Office of Student Outreach and Support at (423) 425-2299.

Student Emergency Fund: The Denise and Tim Downey Student Emergency Fund provides students with limited emergency funding. If you are experiencing financial hardship due to an accident, emergency, illness, or other unforeseen event, and are enrolled full- or part-time, you are eligible for emergency assistance. Funds may be used for (1) essential academic supplies; (2) replacement of items lost due to fire, theft, or flood; (3) short-term housing needs; (4) one-time or non-recurring medical expenses; and (5) emergency expenses related to dependents. For assistance, email or call the Office of Student Outreach and Support at (423) 425-2299.

UTC-Alert System: UTC is committed to providing a safe environment for living, learning, and working. The campus is alerted to emergencies via the UTC-ALERT system. You will receive SMS text messages at the mobile number you provided you registered at UTC. UTC-ALERT will provide important information and instructions to keep you safe during an emergency. When you receive an alert via UTC-ALERT, it is important that you follow any instructions contained in the alert. If you receive a campus closure alert due to inclement weather, your online course will proceed as normal, unless there are extensive power outages.

COVID-19-RELATED INFORMATION AND POLICIES (updated January 1, 2022)

Public health authorities continue to indicate wearing masks in indoor spaces significantly reduces the transmission of COVID-19 and promotes public health. Wearing masks on campus is not required, but you may choose to wear a mask anywhere on campus.

COVID-19 Policies: The UTC COVID-19 policies are subject to change as public health needs and laws or regulations change. Important changes will be communicated to the University community in several ways. You should check the COVID-19 policies periodically.

COVID-19 Vaccinations: UTC recommends that all members of the campus community be vaccinated for their own protection, to prevent disruption to the academic year, and to prevent the spread of COVID-19. The University Health Services staff is available to answer questions or discuss concerns about vaccines. Vaccines are not provided on campus but are available free of charge, or for nominal fees, at several locations throughout the community.

COVID-19 and Class Attendance: If you think you are sick with or have been exposed to COVID-19, you should contact University Health Services or your health care provider. You should not attend face-to-face classes if you have COVID-19.

Importantly, COVID-19 is now considered a serious, but brief or temporary illness. Absences due to COVID-19, or for brief and temporary infectious illnesses like colds, the flu, or strep throat, may be treated like any other class absence. Course attendance policies may address COVID-19 related absences, or those from other infectious illnesses, like absences for any other reason.

For example, if your class permits three absences, and you use one to attend a concert and another to have a long weekend, you may not be allotted additional absences if you experience a temporary illness and miss two or more additional classes.

Departments and instructors have considerable latitude in setting attendance policies for classes. Some classes will have attendance policies and others will not. The lack of a formal attendance policy should not be taken as an invitation to sporadically attend a class. Familiarize yourself with the attendance policy for each of your classes.

ADDITIONAL UNIVERSITY POLICIES AND SUPPORT RESOURCES

Student Support Resources and Privacy and Accessibility Statements: A list of additional resources available to you, and privacy and accessibility statements, are on the Walker Center for Teaching and Learning Student Resources Page:

Statement on Title IX and Mandatory Reporting: Title IX is a federal law that prohibits discrimination based on sex in educational programs and activities that receive federal funds. Discrimination based on sex includes, but is not limited to, sexual misconduct, relationship violence, and stalking. UTC strives to prevent, address, and eliminate this type of misconduct by responding to individual incidents, supporting those who have been harmed, and educating community members on how to create a safe and supportive campus that encourages healthy and respectful relationships.

Faculty members have a responsibility to help create a safe learning environment on our campus. To accomplish this, faculty have a *mandatory reporting obligation* and are required to share information with the University regarding sexual misconduct, relationship violence and/or stalking that is disclosed to them during the performance of their duties.

If you or someone you know has experienced behavior prohibited by Title IX, you may speak to someone confidentially by contacting Survivor Advocacy Services (SAS), located in the Center for Women & Gender Equity, at 423-425-5648 (M-F, 8 a.m. – 5 p.m.).

Questions regarding Title IX, complaints of non-compliance, and complaints of sexual misconduct, relationship violence and stalking may also be directed to the Title IX Coordinator at 423-425-4255 or titleix@utc.edu.

Equal Opportunity Statement, Affirmative Action Policy: In accordance with the requirements of Title VI of the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, Section 504 of the Rehabilitation Act of 1973, and the Americans with Disabilities Act of 1990, The University of Tennessee at Chattanooga affirmatively states that it does not discriminate on the basis of race, sex, or disability in its education programs and activities. Please see the Student Handbook for the complete Affirmative Action Policy.

Religious Accommodations: If you plan to observe a holy day pertaining to your religious faith, and the observance will require you to miss class meetings and/or complete assignments, examinations, or other course requirements on the due date, you should complete the Academic Notification process prior to the date(s) in which the holy day occurs. The Office of Student Outreach & Support (SOS) will review your request and provide verification to course instructors. After SOS notification has been sent, you must contact your instructors to discuss obtaining missed materials from class meetings and/or options for completing missed coursework and other requirements. The course instructor will determine as applicable the appropriate future due dates and option(s) for completing missed coursework or other requirements.

Active-Duty Military and Military Accommodations: UTC values the contributions that active-duty members of the armed forces, veterans of military service, and members of our ROTC Corps of Cadets make to our campus and learning environment. If you are active-duty military, please visit the Center for Military and Veteran's Affairs website for more information on policies and resources related to your active duty status.

If you are serving in the U.S. Military or National Guard and are called to Active Duty, which requires you to miss one or more class meetings and/or completing assignments, examinations, or other course requirements on the due date, you should complete the Academic Notification process as soon as your orders are received. The Office of Student Outreach & Support (SOS) will review and provide verification to course instructors. Upon returning from Active Duty, you must contact your instructors to discuss obtaining missed materials from class meetings and/or options for completing missed coursework and other requirements. The course instructor will determine the appropriate future due dates and option(s) for completing missed coursework or other requirements. You also have the option to officially withdraw from courses impacted by military obligations. Contact the Office of the Registrar and/or the Office of Student Outreach & Support (SOS) for assistance to withdraw.

Pregnancy Accommodations: If you are or become pregnant and need special accommodations because of your pregnancy, contact the Office of Student Outreach and Support for assistance by calling (423) 425-2299 or e-mailing sos@utc.edu.

Class Attendance, Absences and Academic Notification: Class attendance and performance are strongly and positively correlated, *i.e.*, the more regularly you attend, the better you are likely to perform. You should attend class whenever your health or personal circumstances allow. If you are unable to attend class due to an extenuating circumstance, you should complete the Academic Notification process as soon as possible. Examples of extenuating circumstances include, but are not limited to: (1) death of an individual related to the student; (2) physical or mental health concerns; and (3) military, religious, or legal obligations. The Office of Student Outreach and Support (SOS) will review the request and provide verification of need to course instructors. Requests can only be processed by SOS upon receipt of sufficient documentation. Course instructors will determine the appropriate level of leniency, if any, they are able to provide. The student should contact course instructors to discuss if leniency is possible and, if so, options for completing missed coursework or other requirements.

Other Important Resources for Students:

- Academic Calendar
- Center for Advisement & Student Success
- Final Exam Schedule
- Records/Registrar
- UTC Bookstore

This syllabus is subject to change with notification on UTC Learn, email, or other written notification.

CPSC 5800 - Advanced Topics in Systems Software

CRN:20606 **Time**: MWF 12:00 PM - 12:50 PM **Building**: Engr/Math/CPSC **Room**: 306

Start Date: 01/06/2020 **End Date**: 04/28/2020

Instructor: Michael Ward. Mike-ward@utc.edu. 4234254764. Office hours by appointment.

Catalog Description: Current topics drawn from the areas of modern operating systems, parallel software, and distributed computing systems. Topics covered may include the theory, design, programming, security, and performance analysis of particular computer systems software. Prerequisite: CPSC 5020 or placement or department head approval. Standard letter grade. Differential Course Fee will be assessed.

Learning Outcomes: Knowledge of advanced operating system topics such as memory compression, file system deduplication, kernel scheduling, and speculative execution protection.

Course Assessments: The course will consist of two tests (midterm, final), 10 homework assignments and a paper. Each test will be worth 100 points and each homework worth 5 points. The paper will 4000 words and on a subject chosen by the student, related to the course, and approved by the instructor. It will be worth 30 points. Student interaction is expected during class time with attendance being taken and worth 20 points. The final grade will be determined by dividing the earned points by the total points with the resulting percentage mapping to the standard grading scale. Late assignments will be handled on an individual basis but normally 2 point deducted for each week late. Each homework will consist of reading, questions, and a lab portion to be completed within a FreeBSD VM running on the student's computer. Homework will be submitted in PDF format and uploaded to CANVAS. Each test will consist of essay questions with students providing hand written answers during a scheduled class period in EMCS306.

Points Overview:
- 100 Mid Term Exam
- 100 Final Exam, Wednesday, April 22: 10:30 am-12:30 pm
- 30 Paper
- 50 Homework
- 20 Attendance (Students start with 20 points)
- 300 Total

Other dates will be posted on CANVAS LMS.

Instructor Feedback: Grading will occur within 3 days of due date and posted on CANVAS. Email is the best method of communication outside of class time and will receive a response within 24 hours.

Texts:
- Required: 9780321968975 The Design and Implementation of the FreeBSD Operating System, Second Edition

- Recommended: 9781593278922 Absolute FreeBSD: The Complete Guide To FreeBSD, Third Edition

Technology Skills Required: Students should be familiar with the fundamental concepts of programming, computer architecture, and operating systems.

Technology Required: Computer with x64bit processor, 8G of RAM, 30G of free disk space, and the ability to run VirtualBox (VMware, Parallels, etc.). The course will use VirtualBox to host a FreeBSD Virtual Machine, but students can use other virtualization software. VirtualBox is available for Windows, Linux, and MacOS at no cost. https://www.virtualbox.org

Technology Support: If you have problems with your UTC email account or with CANVAS, contact IT Solutions Center at 423-425-4000 or email itsolutions@utc.edu.

Course Learning Evaluation: Course evaluations are an important part of our efforts to continuously improve the learning experience at UTC. Toward the end of the semester, you will receive a link to evaluations and you are expected to complete them. We value your feedback and appreciate you taking time to complete the anonymous evaluations.

Student Conduct Policy: UTC's Academic Integrity Policy is stated in the Student Handbook. https://www.utc.edu/dean-students/student-handbook.php

Honor Code Pledge: I pledge that I will neither give nor receive unauthorized aid on any test or assignment. I understand that plagiarism constitutes a serious instance of unauthorized aid. I further pledge that I exert every effort to ensure that the Honor Code is upheld by others and that I will actively support the establishment and continuance of a campus-wide climate of honor and integrity. https://www.utc.edu/dean-students/conduct/honorcode.php

Student Responsibility: Graduate students must assume full responsibility for knowledge of rules and regulations of the Graduate School and departmental requirements for the chosen degree program. Any exceptions to the policies stated in the Graduate Catalog must be approved by the Dean of the Graduate School. Individual colleges and departments may have requirements beyond the minimum established by the Graduate School.

Americans with Disabilities Act (ADA) and Disability Services
The University of Tennessee at Chattanooga is committed to complying with the Americans with Disabilities Act and assuring that no qualified individual is, by reason of disability, excluded from participation in or denied the benefits of any services, programs, or activities provided by the University.
The Disability Resource Center (DRC) reviews each student's documentation under the guidelines of the Americans with Disabilities Act (ADA) of 1990 and Section 504 of the Rehabilitation Act

of 1973. ADA mandates that accommodations and adjustments be made in programs and activities in order to provide equal access to qualified persons with disabilities. DRC examines the documentation of each student's disability to protect the civil rights of the student. Individual determination of appropriate and reasonable accommodations is made specific to the functional limitations of the disability.

For more information, students are encouraged to contact DRC located in the University Center or to call (423) 425-4006. https://www.utc.edu/disability-resource-center/

EEO/TITLE IX/AA/SECTION 504 STATEMENT

All qualified applicants will receive equal consideration for employment and admissions without regard to race, color, national origin, religion, sex, pregnancy, marital status, sexual orientation, gender identity, age, physical or mental disability, or covered veteran status. Eligibility and other terms and conditions of employment benefits at The University of Tennessee Chattanooga are governed by laws and regulations of the State of Tennessee, and this non-discrimination statement is intended to be consistent with those laws and regulations. In accordance with the requirements of Title VI of the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, Section 504 of the Rehabilitation Act of 1973, and the Americans with Disabilities Act of 1990, The University of Tennessee affirmatively states that it does not discriminate on the basis of race, sex, or disability in its education programs and activities, and this policy extends to employment by the University. Inquiries and charges of violation of Title VI (race, color, national origin), Title IX (sex), Section 504 (disability), ADA (disability), Age Discrimination in Employment Act (age), sexual orientation, or veteran status should be directed to the Office of Equity and Diversity (OED), 201 Human Resources Center, Dept. 5455, 615 McCallie Ave, Chattanooga, TN 37403-2598, telephone (423) 425-5468. Requests for accommodation of a disability should be directed to the ADA Coordinator at the Office of Equity and Diversity.

In compliance with The Family Educational Rights and Privacy Act, The University of Tennessee at Chattanooga provides for the confidentiality of student records. Additional information pertaining to the privacy rights of students can be found at www.utc.edu/Records-Registration/ferpa.html.

Links:
https://utchattanooga.instructure.com(CANVAS)
https://www.utc.edu/records/calendars-and-schedules/2019-2020.php
https://www.utc.edu/auxiliary-services/bookstore/
https://www.utc.edu/information-technology/security/aup.php

Advanced Computer Architecture

Spring 2022

CPSC 5700-0, CRN 20248, online course, 3 credit hours

Instructor: Dr. Joe Dumas

E-mail and Phone Number: Joe-Dumas@utc.edu, (423) 425-4084. On days when classes are in session, you can expect e-mails to be answered within 24 hours. Response time may be longer over weekends and holidays, or if I am traveling out of town (*e.g.,* to a conference). If you need immediate assistance and I am not in my office, please contact CSE administrative specialist Ms. Eva Hunter at (423) 425-4349 or Eva-Hunter@utc.edu.

Office Hours and Location: EMCS 313C – office hours will be posted on my office door. If you would like to make an appointment for a specific time, please e-mail me with possible dates/times you could meet. If you are unable to come to my office in person, please e-mail me to set up a Zoom meeting.

Course Meeting Days, Times, and Location: Asynchronous online class – meets via UTC Learn (Canvas). Lectures recorded during a previous offering of the undergraduate Computer Architecture course will be made available to students via UTC Learn (Canvas) as supplemental study material. Students are highly encouraged to view these instructional videos before beginning work on related assignments.

Course Catalog Description: An advanced course in computer architecture. Topics may include classical uniprocessor architecture, parallel processing architectures, computer arithmetic, instruction sets, control unit design, instruction and arithmetic pipelines, CISC, RISC, superscalar and superpipelined architectures, memory hierarchies, cache and virtual memory mechanisms, and I/O operations. Prerequisite: CPSC 5020 or placement or department head approval. Standard letter grade. Differential Course Fee will be assessed.

Course Pre/Co Requisites: *CPSC 5020 (or CPSC 2800 and CPEN 3700), or placement based on work completed at another institution, or department head approval. If you have any doubts regarding your preparation to take this course, please discuss your situation with me as soon as possible*.

Course Student Learning Outcomes: This course will amplify and expand upon the fundamentals of computer system organization and architecture covered in the undergraduate courses CPSC 2800 and CPEN 3700 (or the graduate foundation course CPSC 5020, or a similar course(s) taken at another institution). Students will learn about the history and evolution of computer architectures and will become conversant with many of the terms and concepts used in

the field of modern computer system design. Topics of particular interest will include von Neumann and non-von Neumann architectures; performance measures and benchmarking; data representations and arithmetic hardware; register and instruction sets; control unit design; pipelining; CISC, RISC, superpipelined, superscalar, VLIW, and multithreaded architectures; parallel processing; exceptions and I/O techniques; cache memory; and memory management systems.

Course Fees: CECS Differential Course Fee applies.

Required Course Materials: Textbook: Dumas, Joseph D. II. *Computer Architecture: Fundamentals and Principles of Computer Design*, Second Edition, CRC/Taylor & Francis, 2017. ISBN 978-1-4987-7271-6.

Free Textbook Access: Thanks to UTC Library's *Affordable Course Materials Initiative*, the required textbook is available to currently enrolled students *free of charge*. You can access an electronic version of the textbook (to either read it online or download a PDF file) by going to the following link: https://doi-org.proxy.lib.utc.edu/10.4324/9781315367118. You will have to authenticate as a UTC student by logging in with your UTCID and password. If you would like a printed copy of the textbook, they are available for purchase from the UTC Bookstore.

Supplemental/Optional Course Materials: Supplemental materials, if needed, may be provided via UTC Learn. One recommended optional supplementary text is: Stokes, Jon. *Inside the Machine: An Illustrated Introduction to Microprocessors and Computer Architecture*, No Starch Press, 2007. ISBN 1-59327-104-2.

Technology Requirements for Course: Students will need a computer with a web browser that is compatible with UTC Learn (Canvas) in order to access assignments. If you are not sure whether your browser is supported, please visit the following link:

https://community.canvaslms.com/docs/DOC-10720-67952720329

The reports for each assignment will require students to use a word processor (*e.g.,* Microsoft Word) and produce a DOC, DOCX, and/or PDF file to submit for grading. Students may do this on their own, personal computers or in any of the CSE department labs (EMCS 306, 312, 321) when they are not in use by another class. Some of the assignments will require students to download and/or run software (*e.g.,* benchmark programs, Telnet/FTP clients, a digital logic simulator, a spreadsheet program, etc.) on a Windows-based personal computer. (Students may optionally use Macintosh computers if they have access to equivalent software, but I do not provide support for Macs.) One assignment will require students to install and run software from the command line in a Unix/Linux environment.

Technology Skills Required for Course: Students must be able to navigate the UTC Learn site using a web browser in order to access and submit the assignments, view other course

information, and participate in the class discussion forum. Students also need to be able to use a word processor to create and save files and must possess basic file manipulation skills in a Windows environment. Students need to be familiar with binary and hexadecimal arithmetic, logic gates, and other basic digital logic circuits introduced in CPSC 5020 or CPEN 3700.

COVID Absences: If you are COVID-19 positive or exposed to someone who is COVID-19 positive, you are encouraged to complete the **COVID-19 Notification form** and follow the recommendations provided by the UTC Health team. Documentation will be provided to me by the Office of Student Outreach & Support.

Similar to any illness, verified documentation must be provided to me in order to provide reasonable accommodations for absences related to COVID-19. Instructors have considerable discretion in deciding how students may make up any coursework. Reasonable accommodations are consistent with other non-COVID-related absences and may include but are not limited to: submission of late coursework within a reasonable amount of time, dropping lowest grade(s), or alternate assignments.

You must, if asymptomatic or if symptoms do not interfere with your ability to participate in the course, **continue to participate in the online course**.

If COVID-19 related illness results in any missed course work (face-to-face or online), it is your responsibility to contact me to plan make-up work. It is *recommended* that **you contact me within 48 hours of recovering** to avoid missing the opportunity to make-up necessary work. Work associated with any absence accommodations must be completed by the student according to the plan devised by the instructor. Class will continue when you are absent, and you may be unable to complete all work by the end of the semester. In such a case, you should consider a late withdrawal. Please contact the Records Office (423-425-4416) to learn more about the late withdrawal process.

If you have a disability related to COVID-19 that may affect your attendance, you may request a disability accommodation by contacting the Disability Resource Center (DRC) (423-425-4006). The DRC will evaluate requests in accordance with the university's disability accommodation process, which involves consultation with your instructors regarding reasonable accommodations that may be granted.

If you believe I have not made reasonable and appropriate accommodations for absences due to COVID-19, you have the right to appeal according to UTC's General Student Grievance (Complaint) Procedure by filling out the Student Complaint Form and submitting to the Office of the Dean of Students.

Technology Support: If you have problems with your UTC e-mail account or with UTC Learn, contact the IT Help Desk at 423-425-4000 or e-mail helpdesk@utc.edu.

Student Technology: If you have technology needs to access your courses and/or complete course requirements in Canvas, submit a request (https://new.utc.edu/information-technology/learning-from-home) with Information Technology.

Student Accommodations: If you have accessibility and accommodation requests, contact the Disability Resource Center (https://www.utc.edu/disability-resource-center/index.php) at 423-425-4006 or email DRC@utc.edu.

Course Assessments and Requirements: Grades will be based on your performance on several graded textbook section/literature reviews, several assignments, class participation (based on the quantity and quality of your posts to the class discussion forum on UTC Learn), a journal article review, and a final project (which will serve as the final examination for the course). Each of these grading components will be described further below. You will also be given reading assignments from the textbook and/or other sources; these will not be graded in and of themselves, but I will expect your understanding of the reading material to be reflected in graded work and class discussion. Your final numerical average for the course will be based on the following weighting: Textbook section/literature reviews (overall average), 30%; assignments (overall average), 30%; class participation, 10%; journal article review, 10%; final project (serves as final exam), 20%.

Course Grading

Course Grading Policy: Letter grades for the course will be assigned on the following scale: 90.00 or higher, A; 80.00 - 89.99, B; 70.00 - 79.99, C; 60.00 – 69.99, D; less than 60.00, F. Grades for each review, assignment, and project will be posted under the Grades tab in UTC Learn.

Instructor Grading and Feedback Response Time: Assignments will be graded and returned as soon as possible, usually within a week, although turnaround time may be longer during busy times of the semester. Graded papers will be available for pickup from my office or, if it is more convenient, I may return them to you electronically. If you have any questions about your grade, contact me as soon as possible. **I will not adjust scores any later than one week after the grade for the item in question has been posted in UTC Learn.**

Course and Institutional Policies

Late/Missing Work Policy: Make sure you are aware of and respect all due dates. *Late reviews, assignments, or projects will be penalized substantially (if they are accepted at all) unless a medical or other legitimate, documented excuse is provided.* Since the course is online and you will be aware of due dates in advance, you should have no direct conflicts and you are expected to manage your time effectively in order to get each item submitted by the due date. (Specific instructions for electronic submission of assignments will be provided; generally, you will be expected to submit items via e-mail as attachments and/or use the online assignment

submission feature of UTC Learn.) If something serious, unanticipated and/or unavoidable (*e.g.,* an auto accident or serious illness) comes up at the last minute, notify me as soon as possible and I will give appropriate consideration to your situation.

Student Conduct Policy: UTC's Student Code of Conduct and Honor Code (Academic Integrity Policy) can be found on the [Student Conduct Policy page](https://www.utc.edu/student-conduct/codes.php) ([https://www.utc.edu/student-conduct/codes.php)](https://www.utc.edu/student-conduct/codes.php).

Honor Code Pledge: "As a student of the University of Tennessee at Chattanooga, I pledge that I will not give or receive any unauthorized assistance with academic work or engage in any academic dishonesty in order to gain an academic advantage. I will exert every effort to insure that the Honor Code is upheld by myself and others, affirming my commitment to a campus-wide climate of honesty and integrity."

Individual Work Policy: All work on textbook/literature/journal article reviews, assignments, and the final project is to be done on a **strictly individual basis** unless I specifically notify you that a group assignment is being given and allow you to work in a group. Individual assignments may be discussed with other students (or outside parties) in a general sense only … **all work handed in is to be your own**. Credit may be reduced or denied for any work which has apparently been copied or which is substantially identical to that of another student(s) or group(s). **Important: Cheating of any kind, or plagiarism in a review or project report, is grounds for assignment of a grade of F for the course for the <u>first offense</u>. Repeated or egregious instances of duplicated work on assignments are also grounds for assignment of a failing grade**. In addition to the above penalties, any student who is involved in an act(s) of academic dishonesty may be reported to the Honor Court for possible further action; penalties may include academic probation, suspension, or dismissal from UTC.

Course Attendance Policy: Students are expected to "attend" class regularly by logging into UTC Learn (if for any reason the system goes down, feel free to e-mail or call the instructor to check for updates). Students are also expected to participate in class by reading and responding to posts in the class discussion forum on UTC Learn (see the section on **Course Participation/Contribution** below).

Course Participation/Contribution: Students are expected to log on to UTC Learn regularly to check for announcements and assignments and, most particularly, to participate in the class discussion forum. Since this is a class that meets online only, and we do not have an assigned class meeting time/location where students can interact with each other and the instructor, the discussion forum is our primary means of achieving that essential interaction. You will be assigned a grade for class participation based on the quantity and quality of your posts to this forum. *Please note that I expect participation to be consistent and regular; a student who posts intelligent and thought-provoking messages multiple times per week, every week will score considerably higher than a student with a lot of "me too" type posts and/or who posts nothing at*

all for many days or weeks and then submits a flurry of messages to "make up" for the inactivity. The general guidelines are that each student should post at least 3 times per week, on at least 3 different days, on topic, at a graduate level of understanding, and approximately 150 words or more each time.

Textbook Section/Literature Reviews: Several times during the semester, students will be given a specific section(s) of the textbook to critically review, summarize, and relate to other available sources in a written paper several (at least 5 but not to exceed 10) pages in length. (Students will be assigned a different section[s] for each review.) For each of these assignments, you will be expected to read and thoroughly understand the assigned material (asking questions of the instructor and/or using the class discussion forum for input from your fellow students as needed), supplement your reading by locating other sources (such as print or online articles) that deal with the same topic, and write up an original review, with citations, that summarizes the knowledge you have gained.

Assignments: Several times during the semester, students will be given assignments to undertake specific exercises or tasks related to computer architecture; for example, benchmarking system performance or simulating aspects of system behavior. Specific and more detailed instructions will be given for each assignment. In general, you will be expected to submit your results (in whatever form is appropriate) along with a professional write-up analyzing the results at a graduate level of understanding.

Journal Article Review: Some time toward the end of the semester you will be assigned (or possibly allowed to choose) an article in a scholarly journal with a focus on computer architecture topics. In a manner similar to the textbook section/literature reviews, you will be expected to summarize and critically review the article, relating it to material you learned from the textbook, class discussion, and any other sources of information in an original written paper several (at least 5 but not to exceed 10) pages in length.

Final Project: Each student (or small group of students, at instructor discretion) will be assigned (or allowed to choose, subject to instructor approval) a topic to research for his or her final project, which will serve as the culminating experience and final examination for the course. Project topics will be unique to each student/group and will be assigned on a first-come, first-served basis. (You are encouraged to contact me with your ideas for potential projects early in the course so you can get topic approval and make an early start, rather than waiting until the last few weeks of the course.) One type of final project would be a detailed report on the architecture and hardware/software implementation of a particular computer system (past or present). An alternative type of project would be a practical investigation of some important topic in computer architecture (perhaps similar to, but in more depth than, one of the assignments); possible examples might include a comparison of cache/non-cache performance in some given computer system(s), benchmarking the performance of compiled high-level language programs on systems with different interconnection networks or pipeline structures, etc. For the first type of project, I

would simply need to know the model name/number and manufacturer of the system you plan to investigate; for the second, I would need a 1-2 page written prospectus of the project to review for approval. Regardless of the specific project topic, a lengthy (20+ pages), detailed, well-referenced, and professional written report, demonstrating understanding at a graduate level, will be required.

Course Learning Evaluation: Course evaluations are an important part of our efforts to continuously improve learning experiences at UTC. Toward the end of the semester, you will be e-mailed links to course evaluations, and you are expected to complete them. We value your feedback and appreciate you taking time to complete the anonymous evaluations.

Course Calendar/Schedule: Due dates for assignments and papers will be communicated via UTC Learn and/or e-mail. A summary of other important dates follows: Classes begin – Monday, January 10; last day to register – Sunday, January 16; MLK holiday – Monday, January 17; last day to drop without a "W" – Sunday, January 23; mid-term grades given out – February 25-March 8; spring break – March 12-20; last day to drop with a "W" – Monday, March 28; spring holiday – Friday, April 15; last day of classes – Monday, April 25; Reading Day – Tuesday, April 26; final project due – TBD (will be announced).

Appendix I. Oral and Written Communication Rubrics

UTC COLLEGE OF ENGINEERING AND COMPUTER SCIENCE
ORAL COMMUNICATION RUBRIC FOR GRADUATE STUDENTS

Name of Student: _____ Major: _____ Date: _____

Instructions: Please mark your score in the last column for each category as described below, and put your total score in the last row.

	1	2	3	4	Score
Organization	Unclear focus, no background information, no outline	Clear focus but no background information, little or no outline	Development is clear with a well- defined outline, but transitions need refinement	Development is clear through use of specific and appropriate examples; transitions are clear and create a succinct and even flow	
Content	Topic is unclear, information appears randomly chosen, poor application of fundamentals	Topic is clear, but supporting information is disconnected and shows poor application of fundamentals	Topic is clear and contains many relevant points and appropriate application of fundamentals, but somewhat unstructured	Exceptional use of material that clearly relates to the focus; abundance of various supported materials	
Presentation Length	Greatly exceeding or falling short of allotted time	Exceeding or falling short of allotted time	Remained close to the allotted time	Presented within the allotted time	
Visual Aids	Poor selection and use of visual aids technology, and not readable images	Appropriate selection and use of visual aids, but use of poorly resolved images	Appropriate selection and use of visual aids, well-focused images	Very good selection and use of visual aids with clearly readable images that complimented talk	
Attention to Audience	No attempt to engage audience	Little attempt to engage audience	Engaged audience and held their attention most of the time	Engaged audience and held their attention throughout with creative articulation, enthusiasm, and clearly focused presentation	
Speaking Skills	Monotone; speaker seemed uninterested in material	Little eye contact; fast speaking rate, little expression, mumbled	Clear articulation of ideas, but some lack of confidence with material	Exceptional confidence with material displayed through poise, clear articulation, eye contact, and enthusiasm	
Comments:					TOTAL SCORE

Name of Reviewer: _____ Signature of Reviewer: _____

WRITTEN COMMUNICATION RUBRIC FOR GRADUATE STUDENTS

Name of Student: _____ Major: _____ Date: _____

Instructions: Please mark your score in the last column for each category as described below, and put your total score in the last row.

	1	2	3	4	Score
Drafting	Requires excessive guidance and prompting from teacher. Is unable to write independently.	Requires occasional guidance and prompting from teacher to write independently. Written work is inconsistent.	An independent writer who requires little guidance or prompting from teacher to write. Written work is usually detailed and creative.	Requires no guidance or prompting from teacher to write independently. Written work is creative and detailed. Student enjoys writing.	
Editing	Student often ignores peer and teacher edits, turning in final products with grammatical and spelling errors. Student does not edit his or her own work at all.	Student accepts peer and teacher edits, but does not edit his or her own work.	Student accepts peer and teacher edits. Student usually edits his or her own work, catching accidental grammatical and spelling errors.	Student accepts peer and teacher edits. Student is also exceptionally meticulous about editing his or her own work, catching most grammatical and spelling errors.	
Revision	Student resists the revision process, making few or no changes from first to final draft.	Student makes minor revisions when necessary. Accepts some constructive criticism from teacher.	Student accepts constructive criticism well from peers and teachers and often comes up with creative and appropriate revision ideas of his or her own.	Student makes full use of the revision process, soliciting and accepting constructive criticism from peers and teachers and implementing his or her own ideas for revision.	
Final Draft	Final draft shows little evidence of editing and revision.	Final draft shows some evidence of editing and revision.	Final draft shows clear evidence of editing and revision.	Final draft shows clear evidence of thoughtful editing and revision.	
Attitude	Shows no enthusiasm for or commitment to the writing process.	Shows some enthusiasm for and commitment to the writing process.	Usually shows enthusiasm for and commitment to the writing process.	Shows exceptional enthusiasm for and commitment to the writing process.	
Timing	Student does not submit any written work on time.	Student submits the work on time with minimum changes.	Student submits the work on time with required changes.	Student submits the work on time with required changes and by providing additional writing materials.	
Comments:				TOTAL	

Name of Reviewer: _____ Signature of Reviewer: _____

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