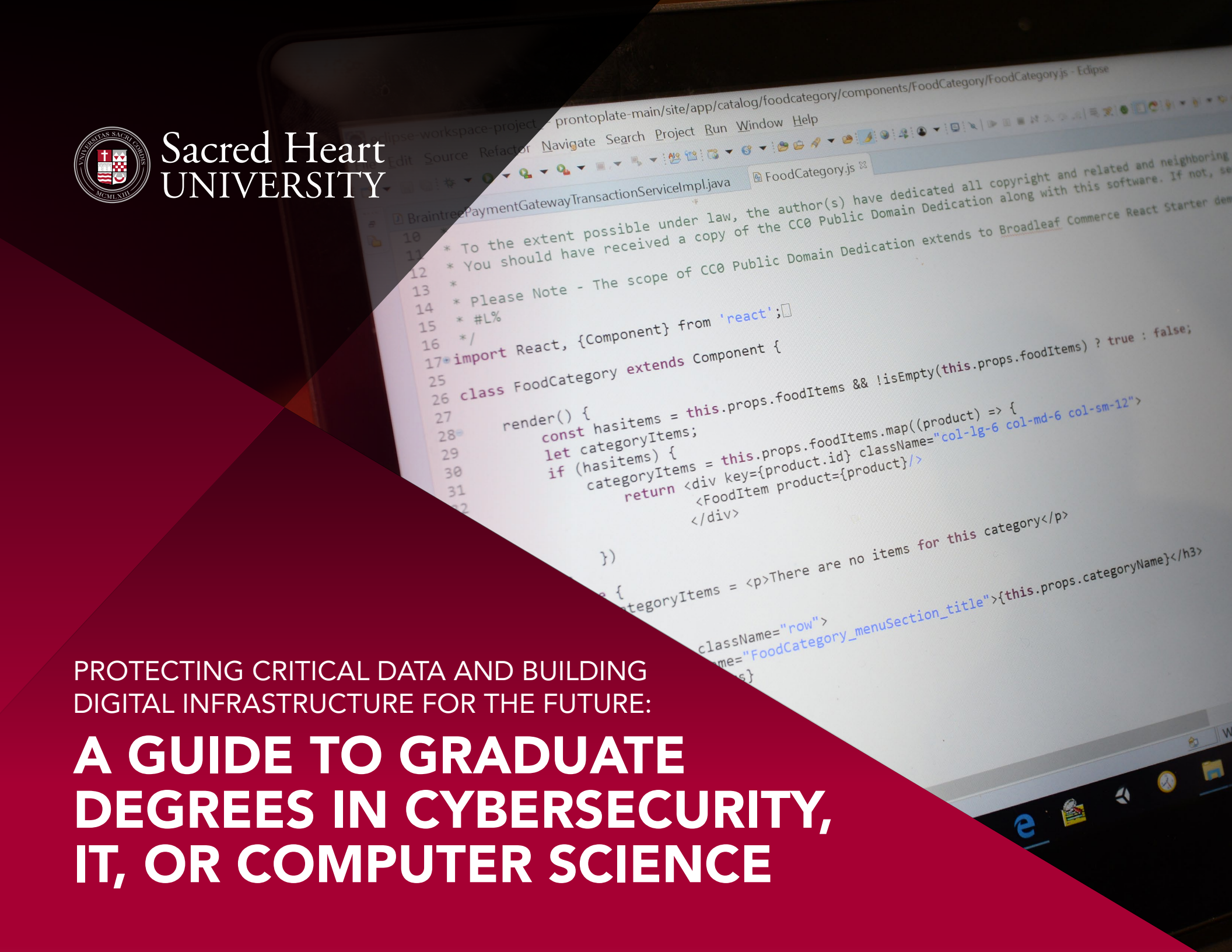
Sacred Heart UNIVERSITY

PROTECTING CRITICAL DATA AND BUILDING DIGITAL INFRASTRUCTURE FOR THE FUTURE:

A GUIDE TO GRADUATE DEGREES IN CYBERSECURITY, IT, OR COMPUTER SCIENCE



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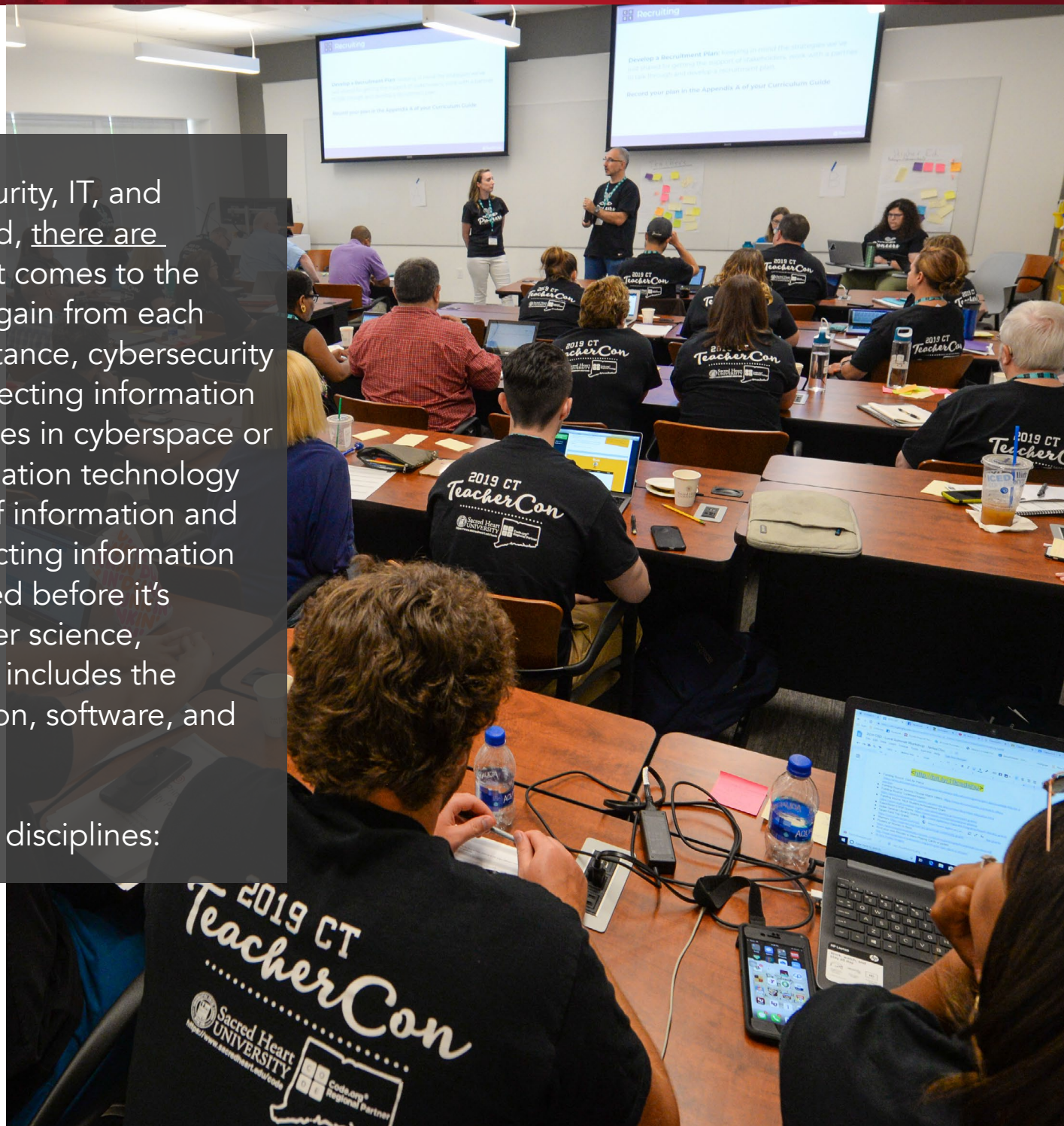
JOIN A COMMUNITY OF EXPERTS AT SACRED HEART UNIVERSITY

In today's rapidly changing, competitive field of technology, the need for experts with advanced skills in fields related to information technology, computer science, and cybersecurity continues to grow. With this resource, we aim to showcase Sacred Heart University's respected Master of Science in Cybersecurity and Master of Science in Computer Science & Information Technology degree programs, and ultimately, give you the tools and knowledge you need to make an informed decision regarding transforming your future with a graduate degree.

While the fields of cybersecurity, IT, and computer science are related, there are differences that exist when it comes to the kinds of specific skills you'll gain from each individual discipline. For instance, cybersecurity involves the practice of protecting information and data from outside sources in cyberspace or the internet, whereas information technology involves the management of information and information systems—protecting information from being stolen or changed before it's processed as data. Computer science, on the other hand, primarily includes the implementation of application, software, and computer development.

So, let's further define these disciplines:



WHAT IS CYBERSECURITY?

According to Cisco, one of the world's leading information technology companies, "Cybersecurity is the practice of protecting systems, networks, and programs from digital attacks. These cyberattacks are usually aimed at accessing, changing, or destroying sensitive information; extorting money from users; or interrupting normal business processes."

In today's increasingly connected world of technology and data, the need for expert cybersecurity professionals who can implement effective cybersecurity measures in a variety of industries continues to increase.

WHAT IS COMPUTER SCIENCE?

According to the Cybersecurity & Infrastructure Security Agency, "cybersecurity is the art of protecting networks, devices, and data from unauthorized access or criminal use and the practice of ensuring confidentiality, integrity, and availability of information." The Bureau of Labor Statistics describes computer scientists as being responsible for inventing, implementing, and designing new approaches to computing technology, and these professionals are also involved in coming up with solutions to complex problems in computing for a wide variety of fields.

WHAT IS INFORMATION TECHNOLOGY?

Information technology is "the technology involving the development, maintenance, and use of computer systems, software, and networks for the processing and distribution of data." IT professionals work with diverse organizations and businesses to develop, install, and manage "viable computer networks" that allow tech-related systems to remain "reliable and efficient," according to Bestcollegereviews.org.

The job outlook for professionals working in fields related to cybersecurity, IT, and computer science is bright. In fact, the Bureau of Labor Statistics predicts that employment in these fields is projected to grow 13 percent between 2020-2030, and in some cases, is predicted to grow as fast as 33 percent—much higher than the national average.

The annual expected earnings for skilled professionals working in cybersecurity, IT, and computer science are high. For instance, the median pay range for those working in roles related to computing, information systems, and security is between $77,000 and $152,000.

Further, the career options available to professionals working in these fields are nearly endless.

Within STEM jobs, computer science and information jobs hold the **top 7 positions** for highest number of employees, with applications software engineers and computer support specialists topping the list.

U.S. News and World Report lists nine of the **TOP 100 JOBS** in the Computer Science and Cybersecurity field:

#1	#5	#13
Information Security Analyst	Software Developer	IT Manager

Careers in Cybersecurity:

- Cybersecurity Specialist/Technician
- Cyber Crime Analyst/Investigator
- Incident Analyst/Responder
- IT Auditor
- Cybersecurity Analyst
- Cybersecurity Consultant
- Cybersecurity Manager/ Administrator
- Cybersecurity Engineer
- Cybersecurity Architect

Careers in IT:

- Cloud Architect
- Computer and Information Systems Managers
- Computer Systems Analyst
- Database Administrator
- Information Security Analyst
- Information Technology Consultant
- Mobile Application Developer
- Network and Computer Systems Administrators
- Software Applications Developer
- Software Developer
- Web Developer

Careers in Computer Science:

- Computer Programmer
- Computer Systems Analyst
- Computer Systems Engineer
- Network Systems Administrator
- Security Architect
- Security Engineer
- Software Applications Developer
- Software Architect
- Software Engineer

Increased Earnings: The research is overwhelming: Professionals who hold a graduate degree make thousands more annually over those who hold a bachelor's degree. According to Indeed, obtaining a graduate degree increases earnings by approximately 20% compared to solely having a bachelor's degree. Not only does a graduate degree significantly increase earning potential, but by studying the economic effects of COVID-19, the Pew Research Center found that more educated individuals were less likely to be unemployed and more likely to maintain financial stability during times of crisis or uncertainty.

Career Advancement: For professionals working in the competitive, ever-changing fields of cybersecurity, IT, and computer science, obtaining a graduate degree will make you a viable candidate for senior leadership positions. In fact, according to the Bureau of Labor Statistics, most jobs for computer and information research scientists require a master's degree. By pursuing a graduate degree in your chosen field, you'll develop the knowledge and skills needed to be considered for leadership roles, and in turn, position yourself as an indispensable thought leader in your field.

Sacred Heart University's School of Computer Science & Engineering, housed within the Welch College of Business & Technology, offers a Master of Science in Cybersecurity and a Master of Science in Computer Science & Information Technology with tracks in Information Technology, Computer Science, and Data Science. Let's dive into the specifics regarding these two graduate programs.

EARN YOUR MASTER OF SCIENCE IN CYBERSECURITY

Increased reliance on technology for everything from daily communication to national defense means increased vulnerability to hackers, network outages, viruses, and cyber attacks, and in Sacred Heart University's **Master of Science in Cybersecurity** program, you will learn to prevent, detect, address, and recover from cyber incidents and security breaches. As a cybersecurity specialist, you will address—and stop—these ever-changing security threats and infiltration techniques.

Sacred Heart University has been designated as a National Center of Academic Excellence in Cyber Defense (CAE-CD) for their Master of Science in Cybersecurity program. SHU is the first in the state of Connecticut to receive this designation.

In SHU's graduate Cybersecurity program, you will:

- Become proficient in products and applications that prohibit cyber threats
- Learn effective technology risk management practices
- Identify new and existing threats and determine methods for mitigation
- Build secure and defendable systems
- Analyze cybersecurity risks and apply real-world solutions
- Perform cybersecurity research
- Gain hands-on experience with security tools

EARN YOUR MASTER OF SCIENCE IN COMPUTER SCIENCE & INFORMATION TECHNOLOGY

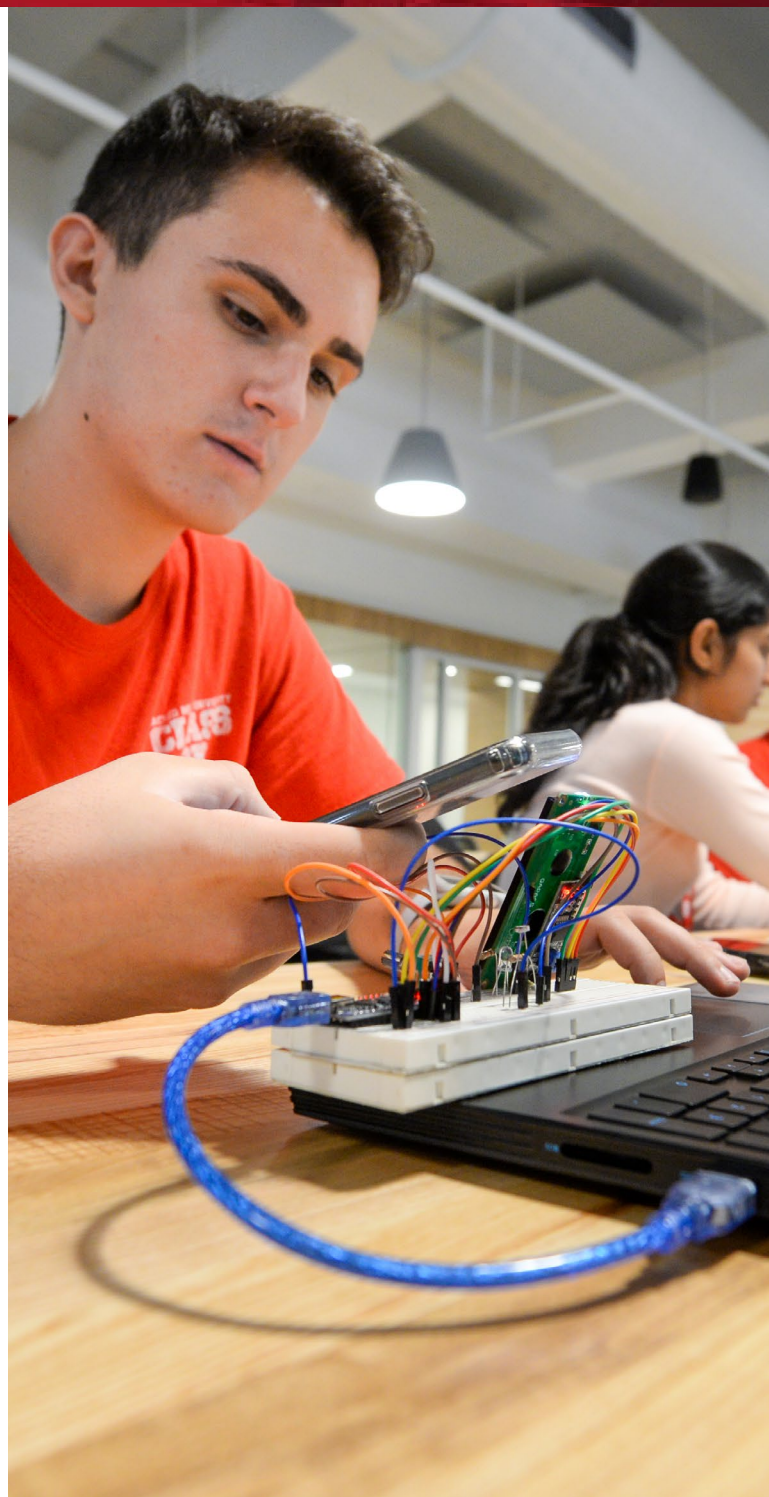
At Sacred Heart University, students who pursue the **Master of Science in Computer Science & Information Technology** degree choose their curriculum track based on their educational and career interests.

Three Track Options:

- Computer Science Track — Computer Science combines theoretical understanding with hands-on work, enabling students to understand the basics of computation and build secure databases and systems that help the virtual world flourish. Sacred Heart University's Master of Science in Computer Science & Information Technology degree prepares individuals for leadership roles in the CS industry. The coursework in our program represents a realistic balance between foundational theory and applied, hands-on technical courses. Core classes include courses in the following areas: Data Structures, Cryptography, Software Engineering, Database and Operating Systems, Programming Languages, Networking, Cyber Security, and Theory of Computation. Electives include Algorithms, Discrete Structures and Logic, Advanced Computer Gaming, Mobile Application Development, Data Warehousing, Web Development, and Cloud Computing.

- Information Technology Track — The exponential growth of the internet and accompanying technologies have transformed business forever. The Information Technology track is designed to prepare you for the dynamics of today's data- and technology- focused workplace and prepares individuals for leadership roles in the industry. This track provides a realistic balance between foundational theory and applied, hands-on technical courses. Core classes include courses in the following areas: Data Structures, Database Design, Programming Languages including Java and Python, .NET, Networking, Adobe Premiere, Information Analysis and System Design, Artificial Intelligence, Machine Learning and Data Analytics. Electives include Network Security, Digital Forensics, Cyber Security, Data Warehousing, Web Development, and Cloud Computing.

- Data Science Track — Data science is the process of using algorithms, methods and systems to extract knowledge and insights from structured and unstructured data. It applies advanced analytics and machine learning to help users predict and optimize business outcomes. The data science core curriculum includes courses in: Python, Programming with R, Data Warehousing and Statistics, Deep Learning, Data Architecture, and Text Mining.



GRADUATE CERTIFICATES IN THE SCHOOL OF COMPUTER SCIENCE & ENGINEERING

Sacred Heart University also offers recognized graduate certificates within the School of Computer Science & Engineering. The certificate programs require the student to complete a minimum of twelve (12) semester credit hours of course work with a minimum cumulative GPA of 3.0.

Available Graduate Certificates:

- **Coding Boot Camp** — This certificate provides a strategy for graduate students looking to change or accelerate their careers. Students will learn to think like professional coders and write effective, efficient code.
- **Cybersecurity** — This certificate is designed to provide individuals with an introduction to networking, risk and threat management, security architecture, ethical and security skills to effectively address the constantly changing threats and risks in our rapidly expanding technology-driven world.

- Database Design — This certificate will help prepare the IT professional for a career as a database specialist or aid the novice in obtaining a job in this field. It will also prepare someone for one of many other information systems careers in which knowledge of database concepts, the design and implementation of databases, and data warehousing are important.
- Game Design and Development — This certificate is designed for the graduate student who has not pursued a computer gaming track or major on the undergraduate level. It will give students an excellent introduction to the field of computer gaming design and development.
- Intelligent Computing — This certificate teaches students to understand the possibilities of today's massive computational power and to use the data far more successfully than ever before.
- Interactive Multimedia — This certificate has been created in response to the recent growth and use of multimedia applications in the modern business environment. By the end, you'll have a foundation in programming and the ability to create the polished work that is necessary in the modern business environment.

- **.Net Technology** — This certificate is a comprehensive and consistent programming model for building applications that can provide visually stunning user experiences and the ability to provide a multiple tiered approach to creating and delivering a variety of applications for web-based programming.
- **Web Development** — This certificate is designed to provide individuals with the background and technical skills needed for a comprehensive understanding of the development, design, and construction of professional Web pages. Emphasis is placed on creating a powerful Web presence by producing sites that are interactive, easily navigated, well-designed and content-rich.

We strive to make applying to graduate school at Sacred Heart University as straightforward and uncomplicated as possible. You can find our admission requirements below:

- Online Application
- Official transcripts from all undergraduate institutions.
- Non-refundable application fee
- 2 Letters of recommendation
- Professional resume
- English language proficiency test score for international students
- International applicants must provide a copy of their passport, a sponsor letter, and a bank letter in order to promptly receive an I-20.
- The address to which all documents can be sent is:

  Sacred Heart University
  Office of Graduate Admissions
  5151 Park Avenue
  Fairfield, CT 06825.

Pro Tip: For information related to financing graduate school, visit our Admission & Financial Aid webpage.

Dr. Sajal Bhatia,
Cybersecurity Program Director

1. **Please tell us about the graduate program(s) and the course(s) you teach at SHU.**

   SHU has two graduate programs: a Master of Science in Computer Science & Information Technology and a Master of Science in Cybersecurity. I have been the instructor for courses including Cybersecurity Explorations, Foundations of Cybersecurity, Network Security, Research Project Seminar, System Security, Thesis I & II.

2. Tell us about your role as Program Director of the MS in Cybersecurity program. What are your roles and responsibilities?

In my role, I overlook the entire program. This specifically includes:

- Reviewing applications of prospective students
- Leading open houses and information sessions
- Student advising and mentoring
- Hiring full-time and adjunct faculty
- Scheduling courses
- Writing grant proposals to seek external funding
- Organizing cybersecurity colloquia series
- Heading the cybersecurity advisory board committee
- Reviewing and updating curriculum
- Proposing new courses
- Leading accreditation and designation efforts
- Maintaining the cybersecurity lab and other instructional needs

3. Why are you passionate about the field of cybersecurity?

One of the main reasons I am so passionate about the field of cybersecurity is that it affects the lives of everyone connected to the Internet in any way, shape, or form. The lack of security and privacy awareness among people also motivates me to design simple, yet effective, ways to teach this discipline.

4. What's unique about SHU's MS in Cybersecurity program?

At SHU, our MS in Cybersecurity program is unique because we offer:

- A dedicated, state-of-the-art cybersecurity network, isolated from the university's network.
- Expert faculty with the perfect balance of academicians and industry professionals who have more than 50 years of combined experience in cybersecurity.
- A flexible and hands-on program that has received the National Center of Academic Excellence in Cyber Defense (CAE-CD) designation, the first in the state of Connecticut to receive this title.
- Placement within SHU's Jack Welch College of Business & Technology, one of fewer than five percent of elite business schools worldwide accredited by AACSB International.

5. How does SHU's graduate cybersecurity program prepare graduates to succeed in the field?

SHU's program prepares graduates to succeed in the field of cybersecurity by providing them with:

- A curriculum that is current and reflects the industry needs
- Hands-on experience with security tools
- Networking opportunities via cybersecurity colloquia series
- Real-world experience via internships and co-op programs

6. What kind of careers do graduates of this program go on to pursue?

Graduates of this program opt for a variety of positions in cybersecurity including, incident responders, cybersecurity analysts, penetration and vulnerability testers, and cybersecurity architects.

7. What are some trends and changes coming to the field?

One of the biggest trends and changes in this field, especially from an instructional standpoint is the shift to hands-on and problem-based pedagogy compared to conventional lecture-based instruction. Another major change is the pace at which this field is changing and evolving. This forces instructors to constantly update their curriculum.

8. Tell us about your research interests and achievements.

My research is predominantly in Cybersecurity – both in wired and wireless domain, in particular exploring areas such as Distributed Denial-of-Service (DDoS) attacks, synthetic traffic generation, critical infrastructure security, and intrusion detection.

My current work explores (1) designing blockchain-based solutions for detecting DDoS attacks in the internet of things (2) automating grading for concept maps (3) building an open cloud-based cyber range (4) problem-based learning for cybersecurity education and (5) intrusion detection system for industrial control systems.

Among my most proud achievements:

1. Awarded $187,964 from the NSA in their CyberSecurity Core Curricula Development program to develop "Instructional Material for SCADA Security Course" in a collaborative project with researchers from the University of New Orleans.
2. Published 20+ research articles in peer-reviewed high-impact journals and conferences.
3. 240+ citations of my research work with both the h-index and i-10 index of 9.
4. Ph.D. thesis titled "Detecting distributed Denial-of-Service attacks and Flash Events" was nominated for the outstanding thesis award at QUT, Australia.
5. Full scholarship along with top-up award for my doctoral studies at QUT.
6. Research grants including: CyberTraining Implementation: Using Problem-Based Learning for Vocational Training in Cyberinfrastructure Security at Community Colleges and Identifying Best DDoS Protection Practices for Power Utility Practitioners.

9. What advice do you have for prospective students thinking about enrolling in the graduate Cybersecurity program?

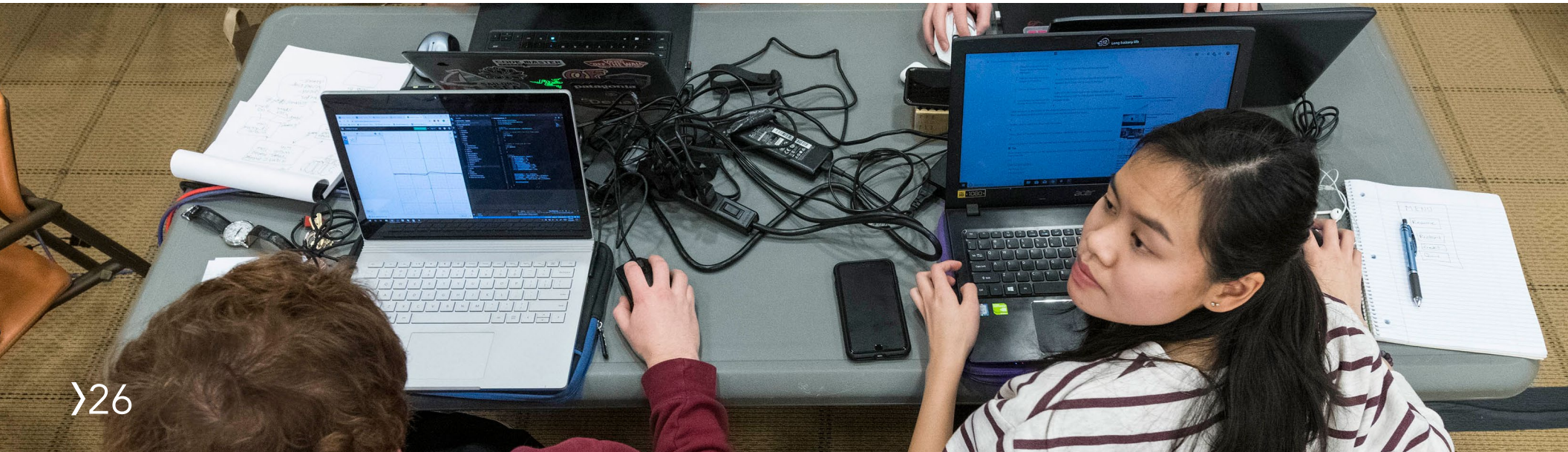
Cybersecurity is an exciting field to work in with more than a million unfilled jobs worldwide and nearly half of them in the US alone. According to the Bureau of Labor Statistics, "cybersecurity jobs are among the fastest-growing career areas nationally" and jobs in the field "will grow 31% through 2029". Cybersecurity Ventures confirms it's one of the fastest-growing areas with a plethora of employment opportunities, reporting that in 2021 alone, "the world's open cybersecurity positions [was] enough to fill 50 NFL stadiums."

Vasu Jakkal, corporate vice president of Security, Compliance and Identity at Microsoft, stated that "Cybersecurity needs people with diverse backgrounds — business, law enforcement, the military, science, liberal arts, marketing design, and an array of other fields." That's why SHU's MS in Cybersecurity program provides students with all the necessary skills (theoretical and handson), knowledge, networking opportunities, and real-world experiences to build a successful and rewarding career in cybersecurity.

10. Is there anything else you'd like to add regarding the community at SHU?

Sacred Heart University is consistently recognized for excellence. For example:

- U.S. News & World Report: Among the Best National Universities, Best Undergraduate Business School, Best Undergraduate Nursing Program, Best Online Bachelor's Programs, Best Online Master's in Nursing Programs, Best Part-Time MBA, Best Graduate Nursing Program, Best Graduate Social Work Program
- Colleges of Distinction 2021-22: Recognized for being a Catholic College of Distinction and a College of Distinction in Connecticut
- The Princeton Review ranked SHU 10th out of 20 universities and colleges on its "Students Most Engaged in Community Service" listing
- The College Gazette named Sacred Heart the #1 Hidden Gem University in New England



Domenick Pinto, MSCSIT
Program Director

1. **Please tell us about the graduate program(s) and the course(s) you teach at SHU.**

   I am the director of the Masters of Science in Computer Science & Information Technology graduate program at SHU. I teach courses including VB.net, Formal Logic, Data Structures, Programming in Python, and Multimedia Design.

2. Tell us about your role as Program Director of the MS in Computer Science & Information Technology. What are your roles and responsibilities?

As Program Director it is my job to advise all students in the program, create the schedule of classes, mentor students, assist with job placement, coordinate academic and social programs, and develop and revise curriculum as needed.

3. Why are you passionate about the field of computer science?

I find the field is very dynamic and expansive. It also uses mathematics to a great extent, which is my true passion.

4. What's unique about SHU's MS in Computer Science & Information Technology program?

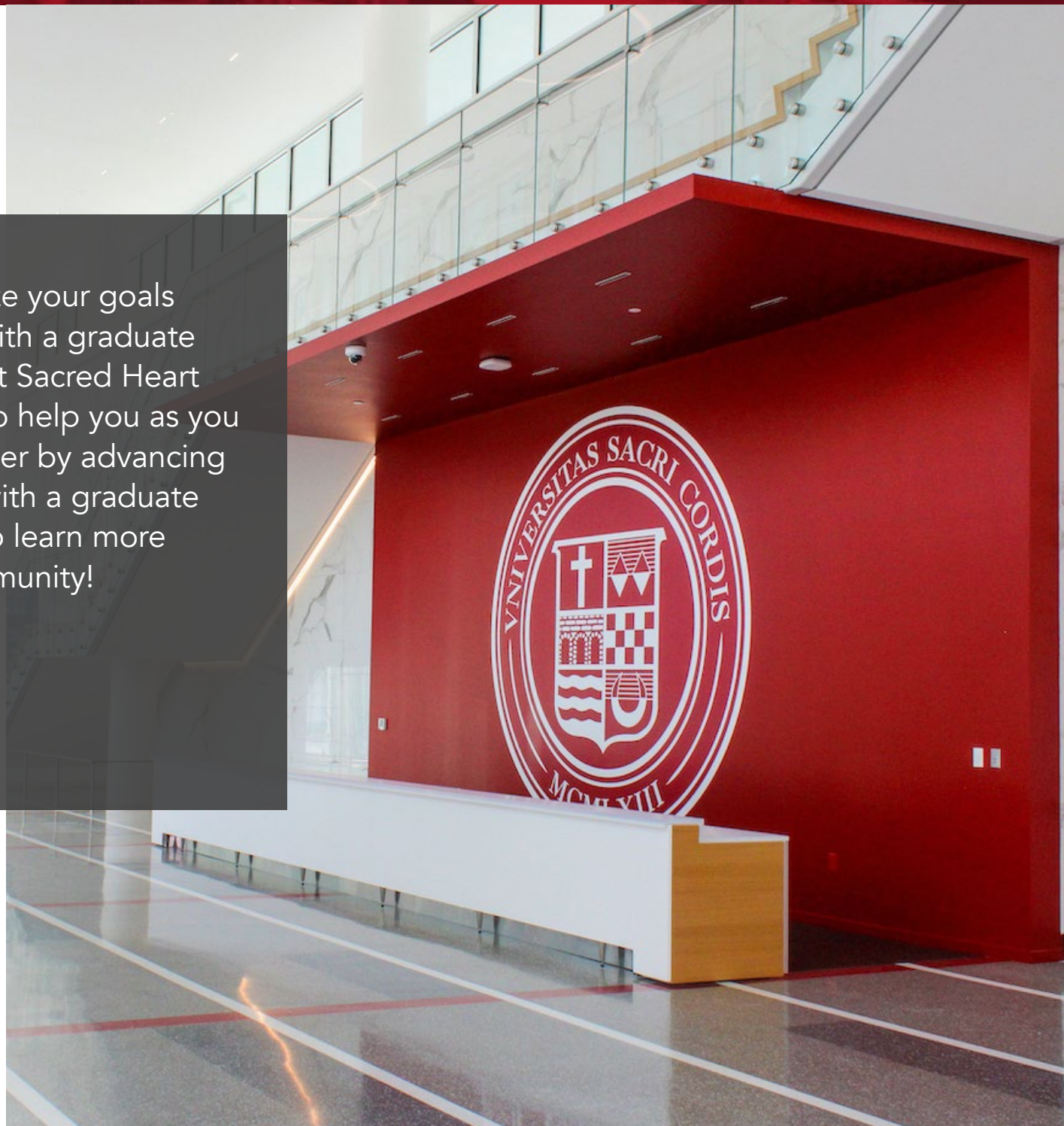
At SHU, we offer more than a degree — we offer seven different certificates that students can earn while simultaneously pursuing their MSCSIT. These certificates are concentrations in particular areas of study and include Database, Multimedia, Web Design, Cybersecurity, Intelligent Computing, .Net Technology, Coding Bootcamp and IT.

5. How does SHU's graduate MSCSIT program prepare graduates to succeed in the field of computer science?

The MSCSIT program at SHU implements a project-based curriculum and uses adjunct faculty members who are currently working in the field. These adjuncts bring real-world professional expertise into the classroom. Additionally, most courses encourage group work dynamics and extensive research. These aspects prepare graduates to enter the workforce with the required hands-on experience needed to make significant contributions to the field.

6. What kind of careers do graduates of this program go on to pursue?

Many graduates of the MSCSIT program go on to pursue careers as network managers, database administrators, software engineers, AI specialists, programmers, systems analysts, and developers.



It's never too late to prioritize your goals and transform your future with a graduate degree. The professionals at Sacred Heart University are standing by to help you as you consider boosting your career by advancing your knowledge and skills with a graduate degree. Contact us today to learn more about joining the SHU community!

Explore Programs
Apply Today
Schedule a Visit