PRESCOTT, ARIZONA

# A DECADE OF EXCELLENCE IN CYBERSPACE

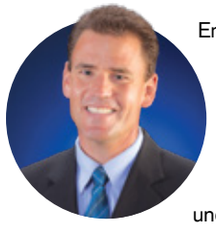
CYBER INTELLIGENCE & SECURITY

EMBRY-RIDDLE
Aeronautical University


We educate and motivate the next generation of cyber professionals to meet 21st-century challenges.

## LETTER FROM THE DEAN

A warm welcome to the College of Business, Security and Intelligence (CBSI) — the nation's only educational institution dedicated to serving the evolving national and global interests and needs that require a fusion of these disciplines.



Embry-Riddle Aeronautical University's Prescott Campus, founded in 1978, offers 25 undergraduate and three graduate programs with a diverse enrollment of over 3,280 students.

Our Cyber Intelligence and Security Department is a trailblazer, positioning the Embry-Riddle Prescott campus as a DHS/NSA Center of Academic Excellence for Cyber Defense, an ABET-accredited Cyber program and a crucial player in the U.S. Cyber Command Academic Engagement Network.

Celebrating the 10th anniversary since its establishment in 2013, the department has seen consistent growth in student enrollment, including a rising number of women, and has graduated over 200 students who are now making a difference and lasting impact across public, private and non-profit sectors.

Securing prestigious grants from the U.S. Department of Defense and the National Science Foundation, we support full-ride scholarships for our students in cyber-related programs and activities, both within and outside the CBSI. These prestigious grants have also grown our cyber infrastructure and research in emerging and crucial topics such as aviation cybersecurity, cyber-physical security, Internet-of-things security and artificial intelligence.

Our commitment to hands-on, direct-application learning equips students for pivotal 21st-century challenges, offering first-hand insights from faculty with extensive academic, industry and government experience. Alongside outstanding faculty that challenge our students and state-of-the-art cyber facilities like the Cyber Lab and Cyber Gym Makerspace, our focus on real-world interdisciplinary learning sets us apart. At CBSI, students engage in research and team projects, often in collaboration with leading industry partners supported by our Cyber Fund for Excellence.

In this publication, we celebrate success and share glimpses of CBSI's contributions to cyberspace in its first decade at Embry-Riddle. These accomplishments fuel our pride, and we invite you to explore how we can collaborate with your institution, providing the talent and resources needed to fulfill your mission. It would be my privilege to initiate a deeper conversation about our shared goals and the potential for future collaborations.

Thomas Drape

**Dr. Thomas Drape**

Dean
College of Business, Security and Intelligence

## EMBRY-RIDDLE OVERVIEW

# No matter what subject our students are passionate about pursuing, Embry-Riddle's degree programs fuel success by combining hands-on experience and career-focused academics that prepare them to become the best and brightest in their fields.

Our courses are designed to meet real-world demands and respond to the changing situations around us, offering a trailblazing education that helps establish our students as industry leaders.

At Embry-Riddle, students gain practical experience from the start with opportunities to participate in research projects and industry internships, collaborate in global competitions and begin building their own professional networks. All our programs offer the chance to learn on-the-job principles practiced by multinational companies and government agencies. This experience sets Embry-Riddle students apart in the competition for internships and jobs.

In the immediate aftermath of the 9/11 attacks, Embry-Riddle took on a leadership role in creating an academic program that focuses on training individuals who would become experts in counterterrorism and counterintelligence domestically and abroad. That initiative has resulted in a highly successful Cyber Intelligence and Security department housed today in the nation's first College of Business, Security and Intelligence at the Prescott Campus.

As the world's largest and most respected university specializing in aviation and aerospace, Embry-Riddle is at the forefront of cyber education and research in these and many other related economic sectors.

With over 155,000 Eagle graduates around the globe, Embry-Riddle students are actively helping forge a new future every day.

### EMBRY-RIDDLE ACADEMIC FACTS

- 96% of Embry-Riddle students are working or continuing their education within a year of graduating
- 155,000 alumni working around the world

### STUDENT FACTS

- 29% of CIS students are female
- Student to Faculty Ratio: 24:1
- 21: Average age of CIS students

### LOCATION FACTS

- Elevation 5,350 ft. in the Bradshaw Mountains; natural beauty and outdoor adventure all around
- 50-mile Prescott Circle Trail goes through campus
- Easy air access to Los Angeles, Denver and many other cities
- Phoenix, Flagstaff, the Grand Canyon and Sedona are all less than two hours away

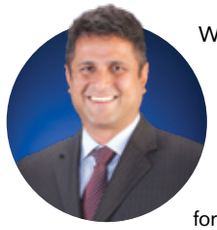
### MILITARY FRIENDLY CAMPUS

- Certified Veteran Supportive Campus
- GI Bill® Yellow Ribbon Program Participant

*GI Bill® is a registered trademark of the U.S. Department of Veterans Affairs (VA). More information about education benefits offered by VA is available at the official U.S. government website at benefits.va.gov/gibill.*

## STATE OF THE CYBER DEPARTMENT

# Celebrating a remarkable 10 years of growth, our Cyber Intelligence and Security Department (CIS) stands as a beacon of excellence.



We are one of the few NSA-designated National Centers of Academic Excellence for Cybersecurity in the world that offers an ABET-accredited cybersecurity program.

Distinguished by scholars funded through the prestigious DoD CySP grant, NSF CyberCorps® SFS grant and Department of State Fellowship, we're also honored to be a member of the US CYBERCOM Academic Engagement Network and RSAC® Security Scholar Program.

The CIS department has evolved into a powerhouse of thought leadership and industry and community engagement, earning recognition for its faculty and students as cyber experts. Our students have excelled in cyber competitions, such as winning the top spot among undergraduate teams in the Department of Energy CyberForce competition. These achievements elevate the university's reputation in academic and industry circles and empower its 200+ graduates to thrive in their career paths.

In the last five years, the CIS department secured over $5.6 million in federal agency funding and industry gifts, enabling our faculty and students to collaborate on innovative projects in cutting-edge areas such as cyber-physical systems, the Internet of Things and Artificial Intelligence.

We have forged robust ties with the industry, addressing their needs and creating employment opportunities for our students. Our world-class outreach program is exemplified by the unique "Capture the Flag" competitions, which set a standard for educating the industry on aviation cybersecurity challenges. Beyond traditional education, we have contributed to world-class cybersecurity training programs for professionals.

Reflecting on the journey of the CIS Department, our commitment to excellence has solidified our position as a leading institution in cybersecurity, positively influencing the global community. We eagerly anticipate continuing our mission of shaping future cyber leaders, advancing education and research and contributing to the broader discourse on securing cyberspace, aviation and aerospace.

With a legacy of intellectual leadership and industry engagement, we expect to remain at the forefront of preparing individuals to navigate the complex challenges ahead. Here's to another decade of excellence and continued contributions to the evolving field of cyber intelligence and security!

**Dr. Krishna Sampigethaya**
**Associate Professor and Department Chair, Cyber Intelligence and Security**


### PROGRAMS

- Bachelor of Science in Cyber Intelligence and Security
- Master of Science in Cyber Intelligence and Security

### DEPARTMENT INSIGHTS

- DHS and NSA National Center for Academic Excellence in Cyber Defense
- One of the world's few ABET-accredited cybersecurity programs
- Recipient of DoD Cyber Scholarship Program grants
- Only NSF CyberCorps® SFS institution for aviation and aerospace cybersecurity
- Offering the world's only aviation cybersecurity competition
- Member of the RSAC® Security Scholar Program
- Member of the U.S. Cyber Command Academic Engagement Network
- Funds for excellence from companies such as Aviation ISAC, The Boeing Company, Collins Aerospace and Lockheed Martin

## ENHANCING NATIONAL SECURITY WITH EXCELLENCE IN CYBERSECURITY EDUCATION

# Embry-Riddle enjoys unique success with Department of Defense and National Science Foundation scholarships.

In an era where cybersecurity is vital to national security, our success with two prestigious and highly competitive scholarship programs — the Department of Defense (DoD) Cyber Scholarship Program (CySP) and the National Science Foundation (NSF) CyberCorps® Scholarship for Service (SFS) program — stands as a testament to our commitment to excellence in this critical field.

Both scholarship programs address workforce shortages, turning academic institutions into cybersecurity hubs and fortifying the nation's defenses. These initiatives are not only a demonstration of the U.S. government's commitment to national cybersecurity but also a strategic investment in cultivating highly skilled professionals.

The CIS department's recognition in both the DoD CySP and NSF SFS scholarships sets Embry-Riddle apart as a distinguished leader. We are also the sole NSF SFS institution in the nation for aviation and aerospace cybersecurity. These distinctions underscore our dedication to excellence and position us as leaders in shaping the next generation of cybersecurity experts.

**DoD CySP: Elevating Military Cyber Security Standards**

As proud recipients of the DoD CySP since 2020, we play a pivotal role in stronger national security. Qualified students selected for the DoD CySP scholarship benefit from comprehensive support, receiving full-ride financial assistance and other benefits. Graduates commit to a cybersecurity role within the DoD, ensuring a supply of skilled professionals for key government agencies.

The CIS department has mentored seven CySP scholars, nearly half of them women. Achieving a noteworthy milestone in the 2022-23 academic year, we boasted one of the highest numbers of CySP scholarships among fellow educational institutions nationally.

Dr. Krishna Sampigethaya, right, with 2023 Cyber Scholars (left to right) Justin La Zare, Victoria Plinski, Jesse Hix and Cameron Devaney.

**NSF CyberCorps® SFS: Leading in Interdisciplinary Cybersecurity Education**

The SFS program, a collaboration between the NSF and select universities, addresses the critical shortage of cyber professionals in government agencies. Students earn full-ride scholarships and commit to working for the government in return.

Emphasizing interdisciplinary education, this SFS program prepares students with technical skills and a broader understanding of ethical, legal and social implications. Since 2022, the CIS department has supported eight SFS scholars, half of whom are women.

**Shaping the Future of Cybersecurity and the Nation**

Our dual success with DoD CySP and NSF SFS scholarships solidifies the CIS department's standing as a pinnacle of cybersecurity education. This achievement reflects our commitment to producing skilled cybersecurity professionals and positions us as a critical contributor to the nation's cybersecurity workforce.

Our scholars get unparalleled learning experiences, mentorship and hands-on training. As they transition into roles within government agencies, they bring a wealth of knowledge, fresh perspectives and a commitment to securing the nation's digital infrastructure.

By nurturing top-tier professionals and contributing to the nation's cybersecurity resilience, Embry-Riddle is helping set a high bar for educational excellence, ensuring the United States remains at the forefront of cybersecurity innovation and defense.

# TRAINING THE NEXT GENERATION OF CYBER WARRIORS

The increasing demand for skilled cyber professionals means a wealth of opportunities for professionals entering the field. Embry-Riddle's graduates are trained to face the challenges of this dynamic, rapidly evolving industry and become leaders within it.

**State-of-the-Art Cyber Labs Give Students Crucial Practical Experience**

Hands-on education and research are foundational for shaping the next generation of cyber defenders. Recognizing this need, Embry-Riddle has continually enhanced its facilities over the last decade to provide cutting-edge resources for our cyber students and faculty.

The state-of-the-art Cyber Lab and the recently opened Cyber Gym Maker Space are central to our commitment. These facilities, designed to be at the forefront of technology, collectively serve as the nucleus for immersive learning and groundbreaking research in cyber intelligence and security.

**Cyber Lab: Bridging Theory and Practice**

Our Cyber Lab transcends the conventional computer-filled room; it is a dynamic, interactive classroom designed to bridge the gap between students and faculty to engage with real-world cybersecurity scenarios.

Instructors guide students through practical exercises, covering topics from setting up secure networks to identifying and mitigating cyber threats.

At the core of the Cyber Lab is an advanced server and networking infrastructure. Combined with industry-grade cybersecurity tools, this infrastructure provides a safe and controlled environment for students to experiment, analyze and simulate various cyber threats.

As part of our commitment to continuous improvement, the lab now hosts an experimental networking rack generously donated by Juniper Networks. This addition will enhance hands-on learning in computer networking and security courses.

**Cyber Gym Maker Space: Fostering Creativity and Collaboration**

In celebration of our 10th anniversary, we proudly introduced the Cyber Gym Maker Space in Building 17 on campus. This collaborative workspace emphasizes a hands-on, do-it-yourself approach to learning and creation. It serves as a hub for students to engage in faculty-mentored projects, sharing resources and knowledge, and as a place for the department to showcase projects and build industry connections.

The Cyber Gym is equipped with cutting-edge software and hardware, including a deep-learning AI server. It encourages participants to explore new ideas, experiment and bring their creative visions to life.

This inclusive space fosters a collaborative atmosphere, mirroring real-world scenarios where diverse teams address complex cybersecurity issues. The Cyber Gym is not confined to student education; it also serves as a research center for our cyber faculty. This synergy between hands-on education and research creates a feedback loop that enriches both teaching practices and the overall knowledge base of the cybersecurity field.

**Preparing Cyber Intelligence and Security Leaders**

Our commitment extends beyond the classroom; we aim to train and shape future cyber experts and leaders. Graduates from our program possess not only theoretical knowledge but also practical skills needed to navigate the complexities of cyberspace.

The doors of our Cyber Lab and Cyber Gym are not just open; they are unlocking the future of cyber education and research, propelling our students toward success in tackling the evolving challenges of the digital and physical worlds.

> "The Cyber Gym Maker Space gives me the opportunity to work out and build a flight simulation environment and an avionics test platform that allows investigation of aircraft and crew cybersecurity. Few institutions offer such opportunities in undergraduate cyber programs!"

**Nathan Johnson ('25)**
Cyber Intelligence and Security Major
Collins Aerospace Intern

## PIONEERING AVIATION CYBER SECURITY INITIATIVES IN THE INDUSTRY

# Enhancing awareness and training of industry in aviation cybersecurity through impactful initiatives and events.

Being responsible for making Embry-Riddle the sole institution recognized by the National Science Foundation CyberCorps® Scholarship for Service focusing on aviation cybersecurity, the department has been a driving force in this field.

Our commitment to aviation cybersecurity education is evident through the organization of international competitions, hosting industry events in collaboration with major aerospace companies and providing hands-on experiences for students.

These initiatives not only contribute to the education and professional development of students but also foster collaboration between academia and industry to address the unique challenges posed by cybersecurity in the aviation sector.

The student teams involved in these initiatives comprised individuals from various disciplines, such as cybersecurity, software engineering, aerospace engineering and aviation.

This diverse participation highlighted the interdisciplinary nature of aviation cybersecurity and the collaborative approach taken by the CIS department.

### The First International Aviation Cyber Security Competition

In 2020, our students and faculty organized the world's first aviation-focused Capture the Flag (CTF) cyber competition at DEF CON and the Aviation Information Sharing and Analysis Center Annual Summit (A-ISAC), which attracted over 220 participants from around the world and showcased how our students and faculty collaborated despite the pandemic and pivoted the CTF to a virtual format.

> "Everyone learned something new related to aviation from this CTF. The CTF was a great educational and team-building experience for cybersecurity aviation beginners and professionals."

**Ray Howard**
Senior Systems Engineer
Southwest Airlines

### Influencing a Tri-Chaired Government Initiative: DHS-DOD-DOT Aviation Cyber Rodeo CTF

In 2023, the CIS department was at the center of a tri-chaired US government initiative, offering its CTF to the employees of agencies and industries responsible for protecting the nation against cyber threats.

Embry-Riddle plays a pivotal role in the joint initiative led by the Department of Homeland Security, Department of Defense and Department of Transportation known as the Aviation Cyber Initiative. Embry-Riddle organized a Cyber Rodeo event at its Daytona Beach campus, with the CIS department spearheading the CTF competition event.

The objective was clear: to enlighten the aviation, security and safety communities on crucial cyber intelligence and security issues. The winning team emerged as ROTC cadets from cyber programs at the Prescott campus and the FAA team coming in at second place, showcasing the diverse talents within the initiative.

Read more about the CTF competition

### Hosting the CTF at the Headquarters of Southwest Airlines and Collins Aerospace

Apart from Florida, the CIS department students and faculty visited various locations in 2023, including the Texas headquarters of Southwest Airlines and Collins Aerospace in Iowa.

At Southwest Airlines, the CTF involved over 30 participants who were cyber and IT security professionals representing 12 different aviation organizations, including major airlines such as American, JetBlue, Lufthansa, Southwest, United and the International Air Transport Association (IATA).

The visit to Collins Aerospace in Cedar Rapids, Iowa, was a unique opportunity for students to interact with professionals in the avionics supplier industry and see their state-of-the-art facilities. Our team offered an aviation cybersecurity CTF experience to their employees.

### Aviation Cyber CTF Propels CIS to Global Prominence

In late 2023, the CIS department soared to new heights, with its students and faculty garnering global recognition by organizing their aviation cyber CTF competition in-person at DEF CON 31 in Las Vegas and the 2023 A-ISAC Cybersecurity Summit in Dublin, Ireland.

## SECURING THE SKIES

# Embry-Riddle students and faculty are helping to identify and mitigate cybersecurity threats in all areas of aviation.

### A Skyline of Innovative Projects Redefining Aviation Cybersecurity Excellence

Since 2019, The Boeing Company has collaborated with the CIS department in a partnership that supports capstone and graduate projects. Led by CIS faculty and Boeing industry experts, the projects are designed to tackle emerging challenges in the industry and reinforce our shared commitment to technical excellence and workforce development.

### Aircraft and Airspace Security

The inaugural Boeing capstone project focused on fortifying airspace security in response to the growing mid-air collision risk from drones. The collaborative effort resulted in a system to provide precise locations of uncrewed aircraft and address incidents of airspace intrusion. Recent milestones include a successful flight test and integration of FAA's required drone Remote ID, which demonstrated the project's feasibility.

### Avionics Cybersecurity

The avionics cybersecurity project delved into the testing of avionic systems to preemptively address vulnerabilities. Using simulation to create realistic avionic environments, the project mimicked aircraft systems for penetration testing. Students gained insights into complex avionics, and the project discovered a major vulnerability in an app used with Electronic Flight Bags, resulting in security being upgraded.

### Enterprise Security and Factory Concerns

Recognizing the expanding digital landscape, this collaborative project teaches students and employees how to address emerging cyber threats to enterprise IT and factory production processes, ensuring the protection of intellectual property and maintaining integrity in the manufacturing cycle.

### Aircraft IoT Security

Boeing's support extends to IoT security within aircraft, where interconnected devices play a crucial role, such as in passenger baggage logistics. This project currently focuses on securing passenger baggage tags within the aircraft and at airports.

These innovative projects, involving Boeing's industry expertise and the CIS department's student talent, faculty mentorship and academic rigor, exemplify a successful partnership at the forefront of aviation cybersecurity.

## PREPARING CYBER-READY PILOTS AND AIR TRAFFIC CONTROLLERS

# The aviation industry's reliance on technology introduces new cyber threats.

A resilient approach to protecting the aviation ecosystem against cyberattacks means the human element should be considered a defense layer.

To study the impact of cyberattacks on pilots and air traffic controllers and prepare them to be cyber-ready, the CIS department has conducted interdisciplinary research projects involving controlled flight and airspace simulations.

### What Happens When Crews or Controllers Face Operational Cyberattacks?

In our flight simulators and Air Traffic Control (ATC) lab, we created realistic cyber threat scenarios to assess how cyberattacks impacted pilots and air traffic controllers. We analyze how the resulting stress can affect decision-making and coordination because understanding these human factors is crucial for developing effective responses to cyber threats.

Our experiments provide insights for strengthening overall cyber resilience. For example, they help develop realistic training scenarios of simulated cyberattacks that train pilots and controllers to better detect, respond to and recover from real-world incidents.

This research also impacts Embry-Riddle as an FAA Air Traffic Collegiate Training Initiative (AT-CTI) school, helping address a cybersecurity education gap in controller training by combining multiple disciplines and introducing cybersecurity into the curriculum and benefiting 32 AT-CTI schools nationwide.

### Can Crews and Controllers Handle the Added Cyber Defense Workload?

Pilots want to be aware and in control of cyber incidents, especially those attacks targeting avionics and other critical systems. However, tension arises from the industry's opinion that cybersecurity tasks increase the workload for pilots and controllers.

Our continuing research in experimenting with pilots and air traffic controllers in lab settings promises invaluable insights into understanding crew tactics, techniques and procedures and human factors involved. We anticipate future research will contribute to the development of effective cybersecurity measures, crew training programs and regulatory frameworks.

## THE LEADER IN AVIATION CYBERSECURITY EDUCATION AROUND THE GLOBE

Embry-Riddle Aeronautical University's Worldwide Campus has taken a groundbreaking step in advancing aviation cybersecurity education on a global scale by introducing a virtual two-week, 40-hour course for the International Civil Aviation Organization (ICAO) titled "Foundations of Aviation Cybersecurity Leadership and Technical Management."

The virtual course had success in the United States, so Embry-Riddle's Worldwide and Asia campuses wanted to elevate its impact by offering an immersive, in-person version of the program at sites around the world. Dr. Krishna Sampigethaya from the Prescott Campus CIS helped bring this vision to fruition by transforming the virtual course into a week-long, intensive training program that delivered a comprehensive understanding of aviation cybersecurity leadership and technical management.

In 18 months during 2022-23, the in-person training program was delivered by Dr. Sampigethaya eight times, attracting a diverse cohort of more than 150 professionals representing 24 countries, including the US, Europe, Middle East, Africa, Asia and Australia.


Among the students were suppliers, regulators, government officials, airline personnel, airport staff and navigation service providers. This diverse representation ensured a holistic and collaborative learning environment, where insights from different corners of the industry helped shape a more thorough understanding of aviation cybersecurity.

The success of this initiative highlights Embry-Riddle's commitment to advancing cybersecurity education and underscores the global demand for specialized training. As the aviation industry continues to evolve in our connected world, initiatives like these play a pivotal role in equipping professionals with the knowledge and skills needed to safeguard critical aviation infrastructure against cyber threats.

In 2023, Embry-Riddle received an ICAO award for this course, recognizing its global impact on aviation and cybersecurity education.

Learn more

## AI-ENABLED CYBER INTELLIGENCE AND SECURITY RESEARCH

# The CIS department has engaged in research to harness Machine Learning (ML) and Artificial Intelligence (AI) for enhancing threat intelligence and cybersecurity.

The establishment of advanced facilities in the department's Cyber Lab and Cyber Gym, such as a deep learning server, is expected to accelerate future research in this domain.

**ML-Enabled Cyber Aid for Pilots and Air Traffic Controllers**

This project aims to use ML and AI to enhance the situational awareness and decision-making of pilots and air traffic controllers facing cyber threats. The focus is on integrating crew-based cybersecurity engagement as a crucial layer to bolster the resilience of aircraft and ATC systems against cyber and cyber-physical attacks.

**ML Applications in Penetration Testing**

Penetration testing is an effective method used to proactively address network vulnerabilities. However, existing challenges include time-consuming processes, susceptibility to human error and a shortage of qualified professionals. To overcome these challenges, this project proposes integrating ML techniques to automate pentest processes and interpret results. The approach is a collaboration between ML and human testers to enhance quality in shorter timeframes.

**ML-Based Intrusion Detection for Drone Communications**

This project focuses on cybersecurity challenges faced by Uncrewed Aircraft Systems, specifically focusing on the vulnerability of their Command-and-Control network protocols. It highlights the potential risks, such as packet injection leading to drone misbehavior, and the limitations of traditional security solutions such as Virtual Private Networks. The project explores the use of ML for intrusion detection.

**ML Applications in Threat Intelligence**

This project explores ML techniques to identify and classify potential malware files. The project compares the assembly (machine code) of files, eliminating the need to execute malicious code. In the realm of AI-assisted intrusion detection, large data models can help enhance the effectiveness of industry-standard tools. The incorporation of ML aims to mitigate the risks of false results.

**700k**

**Cybersecurity roles currently open in the U.S.**

Source: Department of Labor

## ENABLING STUDENTS TO EXCEL IN CYBERSECURITY COMPETITIONS AND CONFERENCES

### The achievements of CIS department students go beyond participation in conferences and winning cyber competitions.

The students are distinguished members of the RSAC Security Scholar program, a testament to the department's commitment to fostering excellence in cybersecurity education and research. Enabling these extra-curricular opportunities underscores our dedication to providing a comprehensive education that goes beyond the classroom and provides avenues for practical application and recognition. As we continue to shape the future of cybersecurity education, we're empowering students to engage with the industry and be cyber leaders of tomorrow.

**Cyber Competitions: A Journey of Excellence**

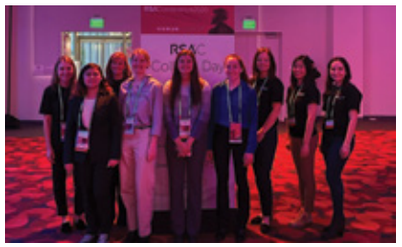
Our students have showcased their skills by excelling in cyber competitions. Whether it's Capture the Flag (CTF) competitions, hackathons or other challenges, our students have proven themselves. Their achievements speak volumes–securing high rankings in multiple competitions and consistently showcasing exceptional technical prowess.

For example, at the state level, in the Tracer Forensic and Incident Response Exercise (FIRE) competition offered twice by the Sandia National Labs at our Prescott campus, our student teams ranked in the top three in 2022 in Arizona and in 2023 in Arizona and Nevada.

In the U.S. Department of Energy's 2021 CyberForce competition, our students ranked fourth overall out of 130 participating teams and distinguished themselves as the top-ranking undergraduates. They showcased their exceptional capabilities in a highly competitive field predominantly composed of graduate student teams. Their success showcased individual excellence and the strength of our ABET-accredited undergraduate cybersecurity program.

In the 2023 International Cyber League Collegiate Cup, our students made a mark by finishing fourth among 100 teams worldwide. This global recognition highlighted individual brilliance and positioned Embry-Riddle's CIS among the top players in international cybersecurity education.

These achievements demonstrate the dedication of our students to mastering cybersecurity, their depth of expertise, their ability to compete at the highest levels and the effectiveness of their education.



**Cyber Security Conferences Empower Holistic Growth for Students**

Our students increasingly recognize the value of attending industry conferences to enhance their knowledge and connect with professionals.

Among these conferences, **RSA, DEF CON** and **Women in Cybersecurity** stand out as key events. They serve as platforms

for our students to engage with industry leaders, participate in hands-on learning and gain real-world insights.


The **RSA Conference** serves as a gateway to the latest industry innovations by bringing together professionals and thought leaders to showcase cutting-edge solutions and provide a holistic view of the landscape. Attending the RSAC College Day enabled our students to learn about emerging threats, cloud security, AI, advancements in cryptography and strategies to safeguard digital assets. Interacting with industry experts has created valuable networking opportunities for them and the CIS department

The **DEF CON conference** has enabled our students to see the value of staying one step ahead of the cyber threat by learning the darker side of cybersecurity. They have been able to test their abilities in real-world scenarios, from hacking a small circuit board to breaking complex AI algorithms. The conference's informal atmosphere has allowed our students to exchange ideas and experiences with seasoned professionals and fellow enthusiasts.


Our women cyber students have continued to attend the **Women in Cybersecurity (WiCyS) Conference** where they connect with like-minded individuals and industry leaders who champion diversity and inclusion. They get to hear inspiring success stories, participate in mentorship programs and engage in discussions on breaking down barriers. The conference equips them with the tools and confidence to navigate the cybersecurity landscape and make meaningful contributions to the field.

### RSAC Security Scholar Program: A Triumph of the CIS Department and its Students

Embry-Riddle is among the select institutions invited to be part of the esteemed RSAC Security Scholar Program, granting us the privilege of nominating students for an all-expenses-paid journey to the RSA Conference.

The inclusion of our students in the RSAC Security Scholar program is more than a personal achievement; it signifies their exceptional caliber and the excellence of our cyber programs, positioning Embry-Riddle's Prescott Campus as a frontrunner in cultivating future cyber leaders.

Attending RSAC as a Security Scholar, our students benefit from exclusive access to mentorship opportunities, specialized research sessions and networking events with top professionals in the industry. This unique experience enhances their understanding of the cybersecurity landscape and solidifies their position as emerging leaders in the field.

## EMPOWERING EXCELLENCE AND HELPING WOMEN THRIVE IN CYBERSECURITY

### Focused on training a diverse pool of professionals to confront the escalating challenges in cyberspace.

In the cyber domain, women in the CIS department are not merely participants; they are carving out their space, breaking barriers and excelling in roles once predominantly occupied by men. We remain committed to enrolling more female students and empowering them to excel.

Over the last decade, the representation of women in our cybersecurity programs has gradually increased, with women today comprising almost 30% of our enrolled student population. Reflecting our commitment to diversity and merit, our cyber faculty includes 33% women, and our DoD CySP and NSF SFS scholar pool takes pride in being 50% women.

We have supported local Girl Scouts troops in cybersecurity badge activities. Recognizing the importance of fostering interest in STEM fields from an early age, we provided resources, expertise and a conducive learning environment for the Girl Scouts to engage in meaningful cybersecurity experiences and spark curiosity and enthusiasm.

We also established the first Women in Cybersecurity (WiCyS) club in the state of Arizona in 2019 to enhance women's engagement in the field. Grace Tevaseu, our inaugural DoD CySP scholar from the class of 2022, transitioned into cybersecurity from her initial career plans in oceanography, exemplifying the diverse paths women can take in this field.

# STUDENT HIGHLIGHTS

Read more about Kestrel

## KESTREL CARLOUGH (’22, ’24)

After earning his undergraduate degree from the CIS department, Kestrel Carlough will complete his graduate degree in 2024. He’s our inaugural NSF CyberCorps® SFS scholar.

Among his many accomplishments, Kestrel earned a place in The Boeing Company’s Security Hall of Fame for his exceptional contribution to cybersecurity. During research supervised by CIS faculty, Kestrel focused on avionics wireless network interfaces, leading him to discover a security vulnerability in a popular Electronic Flight Bag (EFB) app, widely used by pilots around the world.

Kestrel’s investigation revealed a potential threat wherein an attacker on the same local wireless connection as the EFB could exploit a vulnerability. His discovery prompted him to report the issue to Boeing, resulting in a resolution and earning him Hall of Fame recognition.

As a result of his groundbreaking work, Kestrel was also selected as an RSAC Security Scholar and had the unique opportunity to present his research at the RSA Conference.

## JESSE HIX, (’24, ’26)

Jesse is completing a double major in Cyber Intelligence and Security and Global Security and Intelligence Studies. In addition, she is minoring in Mandarin Chinese and Defense Studies. Jesse demonstrates a strong commitment to pursuing a government career in cybersecurity, inspired by a background with military and first responder parents.

Jesse has engaged in summer internships at Peraton and in cybersecurity research projects, authoring security publications at age 17. Her leadership skills come from her experience as an Army ROTC cadet and an assistant cross-country coach.

She is the youngest NSF SFS scholar from the CIS department. Jesse recognizes the SFS scholarship as a valuable opportunity to achieve her educational and professional aspirations in the cyber intelligence and security field.

Read more about Jesse

## FACULTY HIGHLIGHTS

The CIS department has a diverse pool of faculty and accomplished professionals who contribute to the university's academic and research landscape.

Learn more about our faculty

**Dr. Catalina Aranzazu-Suescun** started with the CIS department as an assistant professor in the fall of 2021. Originally from Medellin, Colombia, she holds a Ph.D. in electrical engineering from Florida Atlantic University. She earned her master's in telecommunications engineering from the Pontificia Bolivariana University and her bachelor's in electronic engineering from the University of Antioquia. Her research interests are in IoT security.

**Professor Jesse Chiu** started as a full-time instructor in 2021 and was the inaugural graduate of the CIS department's master's program. With a robust background as an IT systems manager for international companies in Taiwan and a local IT firm in Texas, Chiu brings extensive hands-on experience to the classroom. He's a vital member of the DEF CON Aerospace Village, a diverse community of hackers, engineers, pilots and policy leaders.

**Dr. Jon Haass,** a founding CIS faculty member and former department chair, was pivotal in establishing the nation's first College of Security and Intelligence at the Prescott campus. With over two years as the interim CSI Dean, Dr. Haass focused on enhancing the CIS department's national and international reputation. His research includes AI security. He is an advisory board member for the Arizona Cyber Threat Response Alliance, contributing to regional information sharing and analysis in critical sectors, including aviation.

**Dr. Mathew Heath Van Horn,** a retired Air Force cyber support officer, joined the CIS department as an assistant professor in fall 2022. Growing up in Minnesota, he spent 12 years in the Air Force as an electronics technician before earning a computer science degree and transitioning to cyber roles. After retirement, Dr. Heath Van Horn leveraged his cyber skills to build a successful online business before becoming an assistant professor of IT at SUNY Delhi in New York, where he worked for five years. His research is in OT security.

**Professor Rosa Szurgot** joined the CIS department as an assistant professor in the fall of 2023 after completing a project at NASA Johnson Space Center for the Gateway Program, a Moon orbital outpost vehicle. As an avionics cybersecurity engineer, she contributed to creating cybersecurity requirements for various systems within the Gateway space vehicle. She has vast aerospace industry experience and is now pursuing a Ph.D. She holds a B.S. in Business Administration and Marketing from San Jose State University and an M.S. in Security and Intelligence Studies from Embry-Riddle.

**Dr. Krishna Sampigethaya** has been chair of the CIS department since 2018. He has initiated and led several key projects and helped bring over $5.6 million in funding to Embry-Riddle. Dr. Sampigethaya holds a Ph.D. in electrical engineering from the University of Washington and was the first to defend a thesis on connected vehicle privacy and aviation cybersecurity research. He served as the first Boeing Associate Technical Fellow for aviation cyber-physical security and later as the first associate director for cybersecurity at the United Technologies Corporation Research Center. With over 65 papers, 24 keynotes and 24 patents, Dr. Sampigethaya's contributions have been recognized with prestigious awards.

ALUMNI HIGHLIGHTS

# Graduate reveals her path from Cyber Intelligence and Security student to senior cybersecurity engineer at MITRE.

Michaela Adams ('21) is at the forefront of increasing women's participation in the traditionally male-dominated field of cybersecurity. Acknowledging the underrepresentation of women in cybersecurity, Michaela credits her experience as a student in Embry-Riddle's CIS program with instilling the confidence to help her lead in this challenging domain.

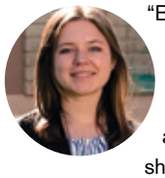
Currently serving as a senior cybersecurity engineer at MITRE in Washington, D.C., Michaela specializes in threat hunting and detection engineering. Her journey began with a passion for computers, leading her to choose Embry-Riddle for its exceptional resources, supportive community and opportunities for growth.

Her experiences, coupled with internships and certifications, prepared Michaela for the next steps in her professional journey. Her dedication and achievements, including winning the Aviation Week Network's Twenty 20s recognition, showcase the positive impact women can have in the cybersecurity field.


Read more about Michaela

## DEPARTMENT OF DEFENSE

**Elizabeth Chwialkowski ('23)**



"Being part of the undergraduate cyber program was an incredible experience, and truly helped to shape my path moving into my future career, opening the door to opportunities I never would have known existed. Outside of classes, being a part of different clubs and research opportunities in the department were invaluable in showing me what areas of cybersecurity I was most interested in. I could not be more grateful to have had these opportunities as an undergraduate student and for the chance to be a part of the CySP scholarship program."

## THE BOEING COMPANY

**Ethan Nadzieja ('22)**

"Embry-Riddle's transformative cybersecurity program provided me with rewarding academic and professional opportunities on campus and after graduation. From theory to application, the comprehensive curriculum has equipped me with foundational cybersecurity skills. Embry-Riddle provides an unmatched combination of expertise and dedication toward helping current students grow into future industry leaders."

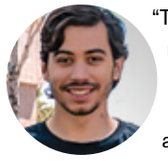
## FEDERAL AGENCY

**Tianna Sardelli ('23)**

"My minor in Security and Intelligence Studies further prepared me more specifically, and the SFS Scholarship supported these programs by opening doors in the intelligence community for a relatively seamless transition into the workforce."

## COLLINS AEROSPACE

**Nathan Fuentes ('22)**



"The program combined my passion for aviation with my interest in cybersecurity and allowed me to develop a unique set of skills that are increasingly desirable in the aviation industry."

## INDUSTRY QUOTES

Here's what our industry partners say about working with students and faculty from Embry-Riddle's CIS department:

"It was such an incredible opportunity for avionics engineers at Collins to spend time with the students from Prescott, showing them the kind of work we do, systems we develop, and learn about what they've been working on while trying to tackle the aviation cyber challenges."

**Patrick Morrissey**
Senior Technical Fellow
Product Cybersecurity
Collins Aerospace

"Had a great time celebrating Cybersecurity Awareness Month with faculty and students from Embry-Riddle Aeronautical University in Prescott. Thanks for bringing us this fun cybersecurity CTF event. We appreciate your knowledge and my team enjoyed sharing the Collins Aerospace story with you through the facility tour and great conversation."

**Clay Lindwall**
Vice President, Avionics Engineering & Technology
Collins Aerospace

"As always, Embry-Riddle's students continue to impress the Tracer FIRE team. We are excited to engage with these students and look forward to seeing them grow in their professional careers."

**Tyler Morris**
Cybersecurity Researcher
Sandia National Laboratories

"Our DHS-DoD-FAA ACI Community of Interest (COI) truly sees the ERAU Cyber Rodeo and Capture-the-flag Event as a fun interactive opportunity. It allows our COI to learn new cyber skills, remove cobwebs for underutilized skills, or fine-tuning existing skills."

**Veronica Bunn**
Member of Aviation Cyber Initiative (ACI) Team,
Office of the CISO, FAA

Find out more about the Cyber Intelligence and Security department.

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Aeronautical University

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**College of Business, Security and Intelligence**
Cyber Intelligence and Security Department
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# One-of-a-kind Cyber Intelligence and Security Department

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