

POLYTECHNIC INSTITUTE



OU-Tulsa Schusterman Center
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Administrative Officer

- Teri K. Reed, PH.D., MBA, F.ASEE
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Administrative Staff

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- Tally Begaye, Undergraduate Admissions Communications Coordinator
- Lauren Deerdoff, Undergraduate Recruiting and Admissions Counselor
- Eric Saulnier, Ph.D., Student Success Administrator

General Information

The OU Polytechnic Institute, first announced for the University of Oklahoma's Tulsa campus in 2022 and expanded in September 2024 to the University of Oklahoma's Norman campus, is Oklahoma's bold new engine for advanced, applied-technology talent. Built shoulder-to-shoulder with industry partners, OUPI now delivers three flexible paths to a Bachelor of Science degree in advanced, applied technology:

- **OU-Tulsa Degree-Completion Pathways** – Finish the last 60 upper-division credits (3000-/4000-level) in just four semesters on the OU-Tulsa campus, earning a Bachelor of Science degree tailored for working adults or transfer students.
 - **Applied Artificial Intelligence (AAI)**
 - **Cybersecurity (CYBS)**
 - **Software Development & Integration (SDI)**
- **OU-Norman Four-Year Programs** – Begin as a first-year student on the Norman campus and pursue one of two full, four-year Bachelor of Science degrees.

- **Applied Artificial Intelligence (AAI)**
- **Software Development & Integration (SDI)**
- **Blended Norman to Tulsa Experience** – Starting in Norman for years 1-2 and complete years 3-4 in Tulsa is an option for all three Bachelor of Science Degrees.

What Sets OUPI Apart

- **Industry-Driven Curriculum** – Every course is co-developed with regional and national employers, ensuring graduates master the tools, frameworks, and workflows companies rely on today and will adopt tomorrow.
- **Learning by Doing** – Studio-style classes, interdisciplinary team projects, paid internships, and industry-sponsored senior design experiences give students a portfolio of real solutions, not hypothetical homework.
- **Work-Ready Capabilities** – Graduates walk out the door fully prepared to contribute on day one with proven project-management skills, a professional network that spans classmates, faculty mentors, and local-to-national employers, and applicable industry certifications.
- **Economic Catalyst** – By feeding a steady flow of innovation-ready talent into the state of Oklahoma, OUPI accelerates the state's emergence as a tech hub—boosting wages, attracting investment, and helping industries compete on a global stage.

The Campus Advantage

- **Tulsa:** All degree-completion courses are delivered face-to-face in state-of-the-art labs, anchoring students in the community they will serve.
- **Norman:** Four-year students benefit from OU's flagship resources while engaging in the same hands-on, project-rich pedagogy that defines the OUPI brand.
- **Blended Path:** Combines the best of both campuses, Norman's vibrant collegiate environment and Tulsa's close industry ties, without adding time to degree.

OUPI isn't just teaching technology—it is using technology to **transform lives, industries, and the future of Oklahoma** from both Tulsa and Norman.

Programs and Facilities

Computing

The OU Network consists of a high-speed backbone with connections to faculty, staff, laboratory, and classroom computers. Wireless technology extends the network to cover the Polytechnic building, outside areas, laboratories, and classrooms. For more detailed information, visit the <https://www.ou.edu/tulsa/it>

Support Infrastructure:

The Information Technology department and OUPI have partnered to provide a comprehensive computer support infrastructure. This includes

wireless coverage, repair services, network file storage, and classrooms equipped with additional power and network capabilities.

Wireless:

All OUPI buildings have wireless coverage throughout. To connect, choose the network called "WIFI@OU". Registration of your device with your 4+4 is required to access this network. Campus guests can receive temporary, limited access by connecting to the "OUGuest" network.

Repair Services:

IT provides student support for all computing needs. To locate the nearest IT Service Center, visit needhelp.ou.edu. The IT Service Centers are Dell and Apple certified warranty repair centers and provide support for these and other brands of computers. This service is free of charge, excluding any parts.

The OU IT Service Team is unable to provide hardware or software support for machines purchased outside of the U.S.

Network Storage:

200 MB of network storage space is provided for students to store homework, projects, or other files. This space is automatically mapped as H:\ in the cybersecurity computer labs. For assistance connecting to the H:\ drive from home or wirelessly, contact the IT Service Desk at 325-HELP or visit the OU-Tulsa Computer Lab at 1C65 or log on to <http://support.ou.edu>.

Undergraduate Study

Admissions

Admission to the University of Oklahoma (Norman Campus) and subsequently a degree granting college is based upon the admission requirements that are in effect for the semester that a student initiates enrollment at OU. For information on current admission requirements, contact the Office of Admissions & Recruitment, University of Oklahoma, Jacobson Hall, 550 Parrington Oval, Room L-1, Norman, OK 73019-4076 or visit their homepage.

Admission to an undergraduate program within the OU Polytechnic Institute is based upon the program requirements in effect at the time of a student's initial enrollment in any institution (including OU) in the Oklahoma State System of Higher Education.

The OUPI uses the same admissions policies for accepting new students into its programs as that of the institution. Students are admitted to the University of Oklahoma using a holistic admissions process. Entry into the OUPI is open to all students who wish to major in an applied technology discipline.

OU Norman Admission Requirements

The minimum requirements for admission to the OUPI are:

- A declared OUPI major;
- Maintain at least a 2.00 combined retention grade point average on all college-level work attempted.

Transfer Admission

An undergraduate student transferring from an institution within the Oklahoma State System of Higher Education must fulfill the transfer admission requirements of the University of Oklahoma Office of Admissions & Recruitment. For more information, visit their website.

A student requesting transfer into a program of the OUPI from another institution must have completed at least 24 semester hours of earned college credit to be considered for admission. Transfer students must have a retention GPA of 2.50 for fewer than 60 earned hours of college-level work or a 2.00 for more than 60 earned hours of college-level work.

The Office of Admissions conducts all initial assessment of transfer coursework. Transfer students who wish to apply un-equated transfer courses towards degree completion are urged to meet with the college's student success administrator.

Major specific transfer coursework will be reviewed by the faculty in the specific discipline for evaluation. For more information, visit the University's Transfer Equivalency Database.

A student requesting to transfer into a program of the OU Polytechnic Institute from another institution outside of the Oklahoma State System of Higher Education will follow the most recent curriculum requirements for the major the student declares.

Transfer Credit

The following credit hour regulations are specific to transfer students:

- All professional courses not taken at the University of Oklahoma are subject to evaluation for equivalency by the appropriate division of the college prior for the approval of these courses as transfer credit.
- Work accepted from other institutions is subject to validation by the satisfactory completion of at least 30 hours of credit in residence.
- College credit for work experience is permitted only under the supervised conditions of the Preceptor Program of the college or approved internship/field experience courses.

OU-Tulsa Completion Program Admissions

For the OU-Tulsa completion program, the degrees offered at the OUPI are considered completion degrees in that only the junior (3000) and senior (4000) level courses are offered at the OUPI location at OU-Tulsa. The first two years can be completed either at OU Norman or can be obtained at another institution (see Transfer Students below).

All students seeking admission to transfer into a program within the OU Polytechnic Institute must fulfill the following minimum requirements:

1. Completed admission to the University of Oklahoma;
2. At least 24 semester hours of earned college credit;
3. Completion of any curricular deficiencies that may exist in English, Math and/or Science;
4. A declared major in the OUPI; and
5. Obtain at least the minimum combined and OU retention grade point average required for graduation from the program the student has declared. All undergraduate programs in the OUPI may require additional admission requirements beyond those listed above. Refer to the respective area for information regarding additional program admission requirements.

Change of Major Requests

Students interested in pursuing a change of major within OUPI, or who are pursuing a major in another college on either the OU-Norman or OU-Tulsa campus but wish to switch to an OUPI program can meet with an academic advisor in OUPI to change majors and/or fill out the Change of Major form. The advisor will assess the student's GPA and completed courses. If the student lacks necessary preparation to begin coursework

in the major, the student might be advised to remain in their current major until they are adequately prepared for the course curriculum. In accordance with State Regents' requirements, students are assigned to the degree program year that was current at the time they entered the Oklahoma State System of Higher Education.

College Regulations

Laptop Requirement

Students with a major in the OU Polytechnic Institute will be required to have a laptop computer. Laptop technologies are used to enhance the learning experience, and using a computer will become second nature to all of our students. See Laptop Policy page (PDF) for recommendations for the specifications needed, as well as other pertinent information.

Bachelor of Science

- Applied Artificial Intelligence, B.S.
- Cybersecurity, B.S.
- Software Development & Integration, B.S.

Accelerated BS/MS Degrees

- Applied Artificial Intelligence, B.S./Applied Artificial Intelligence, M.S.
- Cybersecurity, B.S./Cybersecurity, M.S.
- Cybersecurity, B.S./Cybersecurity Leadership, M.S.
- Software Development & Integration, B.S./Software Development & Integration, M.S.

Graduate Study

LEVEL UP Your Future

The University of Oklahoma Polytechnic Institute (OUPI) offers a broad range of opportunities for advanced academic study and research in the fields of applied artificial intelligence, cybersecurity, cybersecurity leadership, and software development and integration. Our programs are applied in nature and designed to be practical and accessible to individuals from various backgrounds. We have established a minimal entry barrier for aspiring professionals who are eager to advance their careers. With over 200 years of combined industry experience, our faculty offer practical insights and mentorship through both learning and intensive research. By partnering with leading companies in the industry, we provide a hands-on curriculum that prepares for real-world challenges.

Questions about the programs or about any specific requirement or consideration may be addressed to the Student Success Administrator in the OUPI at OUPIadvising@ou.edu.

OU-Tulsa Schusterman Center, 4502 East 41st Street, Tulsa, OK 74135.

Master of Science

- Applied Artificial Intelligence, M.S.
- Cybersecurity, M.S.
- Cybersecurity Leadership, M.S.
- Software Development & Integration, M.S.

Courses

AAI 3103 Robotic Systems 3 Credit Hours

Prerequisite: C S 1213 and MATH 1914 or MATH 2123 or MATH 2423. This course introduces the field of robotics and robotic control systems. The course reviews the history of robotics and then focuses on the concepts of reactive and deliberative paradigms. It then presents concepts and practical examples of guidance systems. Much of the course is dedicated to a major project involving the construction of a robotic system. (F)

AAI 3113 Data Visualization 3 Credit Hours

Prerequisite: C S 1213 or C S 1321 or C S 1323 or C S 1324 or equivalent. This course provides a practical overview of data visualization techniques. It describes visualization types, including bar charts, time series, scatter plots, maps, etc. Students learn how to build visualizations using a standard software package. Visualization of data using Python packages and the incorporation of data visualization into Python notebooks are presented. The course focuses on effective data presentation and storytelling. (Sp)

AAI 3213 Big Data Computing 3 Credit Hours

Prerequisite: CYBS 3913. This course provides an overview of systems used to manage and process big data. It describes GPU architecture and their use in computing. Students learn how to configure CUDA and use of GPUs in Python programming. The course presents an overview of distributed computing and applications. A practical description of Apache Hadoop is provided, including Hive, MapReduce, and Spark. (Sp)

AAI 3303 Machine Learning I 3 Credit Hours

Prerequisite: C S 1213 and MATH 1914 or MATH 2123 or MATH 2423. This course reviews the machine learning (ML) process and presents a set of basic ML methods. The course describes proper modeling techniques, including model evaluation and hyperparameter tuning. The course presents some methods from basic ML categories: supervised learning including regression and classification, and unsupervised learning. For each method, its mathematical intuition is presented with applied programming. (F)

AAI 3313 Machine Learning II 3 Credit Hours

Prerequisite: AAI 3303 and AAI 3333. Mathematical optimization methods are introduced. Common methods in regression, classification, and unsupervised learning are explored. The mathematical theory of each model is presented in detail, and its hyperparameters are described. Feature reduction is described, including its foundation in linear algebra. Mathematical optimization techniques, including linear programming, integer programming, and non-linear optimization are presented. (Sp)

AAI 3323 Reinforcement Learning 3 Credit Hours

Prerequisite: CS 1213 and MATH 1914 or MATH 2123 or MATH 2423. This course will introduce reinforcement learning (RL), a computing method in which agents solve problems, through repeated attempts resulting in penalties or rewards based on trial outcomes. The course discusses multi-armed bandits and progresses to other topics including Markov decision processes, on-policy and off-policy learning. The course reviews practical applications of RL. Lectures are supported by coding assignments in Python. (F)

- AAI 3333 Mathematics of Artificial Intelligence 3 Credit Hours**
Prerequisite: MATH 1914 or MATH 2123 or MATH 2423. This course introduces two mathematical disciplines that form a foundation for AI/ML algorithms. Linear algebra lessons cover systems of linear equations, matrices, determinants, vector spaces, bases, dimension, eigenvalues, and eigenvectors. Probability theory covers counting, conditional probability, discrete and continuous random variables, probability distributions, likelihood, curve fitting, and regression. This course focuses on applications and emphasizes conceptual understanding and application. (F)
- AAI 3440 Mentored Research Experience 3 Credit Hours**
0 to 3 hours. Prerequisite: ENGL 1113 or equivalent, and permission of instructor; May be repeated, maximum credit 12 hours. For the inquisitive student to apply the scholarly processes of the discipline to a research or creative project under the mentorship of a faculty member. Student and instructor should complete an Undergraduate Research & Creative Projects (URCP) Mentoring Agreement and file it with the URCP office. Not for honors credit. (F, Sp, Su)
- AAI 3990 Independent Study 1-3 Credit Hours**
1 to 3 hours. Prerequisite: Permission of instructor and junior standing. May be repeated once with change of content. Independent study may be arranged to study a subject not available through regular course offerings. (F, Sp, Su)
- AAI 4103 Natural Language Processing 3 Credit Hours**
(Slashlisted with AAI 5103) Prerequisite: AAI 4303. This course will provide a review of natural language processing (NLP) methods. It presents the intuition behind major approaches to NLP problems such as translation. Concepts include word corpora, probabilistic methods, and Python libraries including NLTK and SpaCy. The course presents generative AI with a focus on transformers and modern tools such as OpenAI. No student may earn credit for both 4103 and 5103. (Sp)
- AAI 4113 Computer Vision and Image Recognition 3 Credit Hours**
(Slashlisted with AAI 5113) Prerequisite: AAI 3313. This course introduces the field of computer vision. Topics include image recognition and formation, reconstruction of 3D images from 2D renderings, scene understanding, and motion tracking. It includes reviews and overviews of the mathematics behind computer vision. It also includes a conceptual overview of convolutional neural networks and their application to image recognition. No student may earn credit for both 4113 and 5113. (F)
- AAI 4203 Advanced Database Systems 3 Credit Hours**
(Slashlisted with AAI 5203) Prerequisite: CYBS 3913. This course focuses on technologies used for massive datasets and unstructured data. Students learn how to implement Spark RDBs with distributed computing resources. The course presents NoSQL databases, their use and implementation. Graph databases and management of unstructured data and its incorporation into databases are presented. In all cases, students will build and manage databases using current common application frameworks. No student may earn credit for both 4203 and 5203. (Sp)
- AAI 4303 Deep Learning I 3 Credit Hours**
(Slashlisted with AAI 5303) Prerequisite: AAI 3313. This course will introduce deep learning through neural network programming. The course introduces the concept of the artificial neuron and progresses to describe multi-layer neural networks with a focus on the mathematics that make them work. The course describes how TensorFlow and PyTorch solve neural networks, and students build basic neural networks using these tools. No student may earn credit for both 4303 and 5303. (F)
- AAI 4313 Deep Learning II 3 Credit Hours**
(Slashlisted with AAI 5313) Prerequisite: AAI 4303. This course reviews various modifications to basic neural networks. Topics include convolutional neural networks (CNNs), recurrent neural networks (RNNs), and long short-term memory neural networks (LSTMs). The intuition behind the algorithms is presented and the mathematics for each compute element are reviewed. Students program the methods in TensorFlow or PyTorch. This course emphasizes the practical applications for each method. No student may earn credit for both 4313 and 5313. (F, Sp)
- AAI 4323 Ethics of AI and Machine Learning 3 Credit Hours**
(Slashlisted with AAI 5323) Prerequisite: AAI 3313. This course provides a survey of legal and ethical topics associated with AI and ML. Global laws and regulations associated with AI and ML are reviewed and their impact on practitioners will be discussed. The algorithmic causes of bias will be reviewed, and methods to alleviate those will be discussed. Methods for bias measurement in AI/ML models will be presented. No student may earn credit for both 4323 and 5323. (F)
- AAI 4333 Applications of Deep Learning 3 Credit Hours**
(Slashlisted with AAI 5333) Prerequisite: AAI 4303. This course builds upon the concepts presented in Deep Learning I by reviewing various modifications to basic neural networks. Topics include convolutional neural networks (CNNs), recurrent neural networks (RNNs), long short-term memory neural networks (LSTMs), and transformers. In each case, the intuition behind the algorithm is presented and students construct basic models using PyTorch and/or TensorFlow. No student may earn credit for both 4333 and 5333. (Sp)
- AAI 4903 AAI Capstone Project 3 Credit Hours**
Prerequisite: AAI 4303 and Senior Standing. Provides the students with an experience to exhibit their knowledge and skills in areas of artificial intelligence. Students work in small groups to identify and scope an artificial intelligence problem and/or challenges. Required to write a proposal about their project and asked to create a work plan to develop solutions to solve the problem/challenge. Create a final report and presentation. (Sp)
- AAI 4990 Independent Study 1-3 Credit Hours**
1 to 3 hours. Prerequisite: permission of instructor and senior standing; May be repeated once with change of content, maximum credit 6 hours. Independent study may be arranged to study a subject not available through regular course offerings. (F, Sp, Su)
- AAI 5103 Natural Language Processing 3 Credit Hours**
(Slashlisted with AAI 4103) Prerequisite: Graduate Standing. This course will provide a review of natural language processing (NLP) methods. It presents the intuition behind major approaches to NLP problems such as translation. Concepts include word corpora, probabilistic methods, and Python libraries including NLTK and SpaCy. The course presents generative AI with a focus on transformers and modern tools such as OpenAI. No student may earn credit for both 4103 and 5103. (Sp)
- AAI 5113 Computer Vision and Image Recognition 3 Credit Hours**
(Slashlisted with AAI 4113) Prerequisite: Graduate Standing. This course introduces the field of computer vision. Topics include image recognition and formation, reconstruction of 3D images from 2D renderings, scene understanding, and motion tracking. It includes reviews and overviews of the mathematics behind computer vision. It also includes a conceptual overview of convolutional neural networks and their application to image recognition. No student may earn credit for both 4113 and 5113. (F)

- AAI 5203 Advanced Database Systems 3 Credit Hours**
(Slashlisted with AAI 4203) Prerequisite: Graduate Standing. This course focuses on technologies used for massive datasets and unstructured data. Students learn how to implement Spark RDBs with distributed computing resources. The course presents NoSQL databases, their use and implementation. Graph databases and management of unstructured data and its incorporation into databases are presented. In all cases, students will build and manage databases using current common application frameworks. No student may earn credit for both 4203 and 5203. (Sp)
- AAI 5303 Deep Learning I 3 Credit Hours**
(Slashlisted with AAI 4303) Prerequisite: Graduate Standing. This course will introduce deep learning through neural network programming. The course introduces the concept of the artificial neuron and progresses to describe multi-layer neural networks with a focus on the mathematics that make them work. The course describes how TensorFlow and PyTorch solve neural networks, and students build basic neural networks using these tools. No student may earn credit for both 4303 and 5303. (F)
- AAI 5313 Deep Learning II 3 Credit Hours**
(Slashlisted with AAI 4313) Prerequisite: Graduate standing and AAI 5303. This course reviews various modifications to basic neural networks. Topics include convolutional neural networks (CNNs), recurrent neural networks (RNNs), and long short-term memory neural networks (LSTMs). The intuition behind the algorithms is presented and the mathematics for each compute element are reviewed. Students program the methods in TensorFlow or PyTorch. This course emphasizes the practical applications for each method. No student may earn credit for both 4313 and 5313. (F, Sp)
- AAI 5323 Ethics of AI and Machine Learning 3 Credit Hours**
(Slashlisted with AAI 4323) Prerequisite: Graduate Standing. This course provides a survey of legal and ethical topics associated with AI and ML. Global laws and regulations associated with AI and ML are reviewed and their impact on practitioners will be discussed. The algorithmic causes of bias will be reviewed, and methods to alleviate those will be discussed. Methods for bias measurement in AI/ML models will be presented. No student may earn credit for both 4323 and 5323. (F)
- AAI 5333 Applications of Deep Learning 3 Credit Hours**
(Slashlisted with AAI 4333) Prerequisite: Graduate Standing. This course builds upon the concepts presented in Deep Learning I by reviewing various modifications to basic neural networks. Topics include convolutional neural networks (CNNs), recurrent neural networks (RNNs), long short-term memory neural networks (LSTMs), and transformers. In each case, the intuition behind the algorithm is presented and students construct basic models using PyTorch and/or TensorFlow. No student may earn credit for both 4333 and 5333. (Sp)
- AAI 5903 Master's Practicum 3 Credit Hours**
Prerequisite: Graduate Standing. The course provides students with knowledge and skills in all areas of artificial intelligence. Students will work in small groups to identify and solve current artificial intelligence challenges. Students will be required to write a proposal about their project, create a work plan to solve the problem/challenge, and create a final report, with final presentation. (Sp)
- AAI 5960 Directed Readings 1-3 Credit Hours**
1 to 3 hours. Prerequisite: Graduate standing and departmental permission. Directed readings and/or literature reviews under the direction of a faculty member. May be repeated; maximum credit six hours. (F, Sp, Su)
- AAI 5980 Research for Master's Thesis 2-9 Credit Hours**
2 to 9 hours. Prerequisite: Graduate Standing and Instructor Permission. Directed research culminating in the completion of the master's thesis. Variable enrollment, permission of instructor required, two to nine hours; maximum credit required for degree, six hours. (F, Sp)
- AAI 5990 Independent Study 1-3 Credit Hours**
1 to 3 hours. Prerequisite: Graduate standing and permission of instructor. Contracted independent study for a topic not currently offered in regularly scheduled courses. Independent study may include library and/or laboratory research and field projects. May be repeated; maximum credit six hours. (Irreg.)
- CYBS 3113 Operating Systems Fundamentals 3 Credit Hours**
Prerequisite: CYBS 3123. This course introduces major concepts and techniques for designing and implementing operating systems, including memory management, process management, information management, and computer security. Principles of performance evaluation. Class projects require the design and implementation of software systems. A UNIX family operating system will be used. (Sp)
- CYBS 3123 Introduction to Unix Systems 3 Credit Hours**
Prerequisite: Junior standing. This course provides an introduction to the UNIX operating system. Topics include files and directories, electronic mail, security, advanced file systems, network utilities, network file sharing, text utilities, shell programming, regular expressions, UNIX internals, UNIX system administration, UNIX variations, and systems programming. Programming assignments involve the UNIX shell script language. (F)
- CYBS 3213 Foundations of Cybersecurity 3 Credit Hours**
Prerequisite: Junior standing. This course introduces cybersecurity, principles, and technologies. It deals with security issues related to systems and software. Topics include cyber threats and vulnerabilities, information security frameworks and policies, cryptography, penetration testing, and in-depth defense. The goal is to develop a foundation for further study in cybersecurity. (F)
- CYBS 3223 Applied Statistics for Computing 3 Credit Hours**
Prerequisite: CYBS 3123 or concurrent enrollment in CYBS 3123. This course focuses on hardware (HW) security and covers security and trust from the HW perspective. It introduces students to HW components, including SoC and PCB, and examines security and trust issues in such HW components. Topics include digital lock, circuit theory, ASICs and FPGAs, HW security threats, malware, and attacks, along with specific countermeasures against HW attacks. (Irreg.)
- CYBS 3313 Introduction to Cyber Ethics and Law 3 Credit Hours**
Prerequisite: Junior Standing. Legal and ethical issues with networked IT, including privacy, surveillance, digital piracy, and military use. First unit introduces ethical frameworks applicable to cybersecurity, sources of applicable law and regulation. Second unit introduces issues relating to cybercrime: intellectual property, user privacy, information assurance, and harmful online content. Third unit introduces issues with IT in government operations. (Sp)
- CYBS 3323 Hardware Security 3 Credit Hours**
Prerequisite: CYBS 3123 or concurrent enrollment in CYBS 3123. This course focuses on hardware (HW) security and covers security and trust from the HW perspective. It introduces students to HW components, including SoC and PCB, and examines security and trust issues in such HW components. Topics include digital lock, circuit theory, ASICs and FPGAs, HW security threats, malware, and attacks, along with specific countermeasures against HW attacks. (Irreg.)

- CYBS 3440 Mentored Research Experience 3 Credit Hours**
0 to 3 hours. Prerequisites: ENGL 1113 or equivalent, and permission of instructor. May be repeated; maximum credit 12 hours. For the inquisitive student to apply the scholarly processes of the discipline to a research or creative project under the mentorship of a faculty member. Student and instructor should complete an Undergraduate Research & Creative Projects (URCP) Mentoring Agreement and file it with the URCP office. Not for honors credit. (F, Sp, Su)
- CYBS 3743 Cyberforensics Fundamentals 3 Credit Hours**
Prerequisite: CYBS 3213. This course introduces students to cyber forensics and cyber-crime scene analysis fundamentals. The various laws and regulations dealing with computer forensic analysis are discussed. Students are introduced to the emerging international standards for cyber forensic analysis and a formal methodology for conducting computer forensic investigations. (Sp)
- CYBS 3813 Network Fundamentals 3 Credit Hours**
Prerequisite: Junior standing. Introduces the fundamentals of computer networks, including network architectures, network topologies, network protocols, layering concepts (for example, ISO/OSI, TCP/IP reference models), wired and wireless network protocols, communication paradigms (point-to-point vs. multicast/broadcast, connectionless vs. connection-oriented), and networking APIs (sockets). Protocols in all layers will be introduced. In this course, socket programming is also introduced. (Sp)
- CYBS 3913 Database Fundamentals 3 Credit Hours**
Prerequisite: Junior standing. Introduction to the concepts behind relational database systems, modeling with Entity-Relationship diagrams and how these are used for data design. SQL to define, manipulate, and test the database, programmatic access, and practical issues. Strong foundation in database security, auditing principles, practices and methodologies. Topics: application security models, security architecture, access controls, auditing, trust management, privacy, threat vectors, and attack methods. (Sp)
- CYBS 3990 Independent Study 1-3 Credit Hours**
1 to 3 hours. Prerequisite: permission of instructor and junior standing. May be repeated once with change of content. Independent study may be arranged to study a subject not available through regular course offerings. (F, Sp, Su)
- CYBS 4103 Developing Secure Software 3 Credit Hours**
(Slashlisted with CYBS 5103) Prerequisite: CYBS 3813 and CYBS 3913. This course covers topics at the intersection of security and software engineering. This course introduces software engineering processes and standards for building secure software applications. It discusses secure software life cycle development principles to include security in every phase. It also explores security issues and vulnerabilities in software applications due to a lack of secure software engineering processes. No student may earn credit for both 4103 and 5103. (F)
- CYBS 4123 System Administration 3 Credit Hours**
(Slashlisted with CYBS 5123) Prerequisite: CYBS 3123. This course provides a comprehensive introduction to system administration. Topics include virtualization, authentication and authorization, directory services, system management, and system security and set up of modern compute and storage clouds, networking systems, file systems, logging and analysis, and networking. Includes topics related to scripting for all administrative functions. Emphasis is placed on enterprise-level systems. No student may earn credit for both 4123 and 5123. (F)
- CYBS 4133 Ethical Hacking and Penetration Testing 3 Credit Hours**
(Slashlisted with CYBS 5133) Prerequisite: CYBS 3113. This course covers concepts related to ethical hacking and penetration testing methods to assess, exploit, and report security vulnerabilities on systems and their resources. The course will emphasize the ethical application of penetration testing methods and hacking tools. No student may earn credit for both 4133 and 5133. (F)
- CYBS 4203 Cybersecurity Risk Management and Assessment 3 Credit Hours**
(Slashlisted with CYBS 5203) Prerequisite: CYBS 3213. This course develops competency in information security policies and plans, including controls for physical hardware, software, and networks. The course introduces security risk detection strategies, countermeasures, damage assessment, and control. The course introduces the students to performing information system risk analysis and management audits. Tools for analyzing log files of various kinds will also be introduced. No student may earn credit for both 4203 and 5203. (F)
- CYBS 4293 Introduction to Cloud Computing and Security 3 Credit Hours**
(Slashlisted with CYBS 5293) Prerequisite: CYBS 3113. Course covers the concepts behind cloud computing, including storage and computing. We will also learn about virtualization, software as a service, and deployment models. We will learn about cybersecurity risks on cloud infrastructure and countermeasures using access policies, distributed access control, key management, and others. Covers topics in the cloud computing security guidelines set forth in international standards organizations. No student may earn credit for both 4293 and 5293. (Sp)
- CYBS 4323 IoT Security and Privacy 3 Credit Hours**
(Slashlisted with CYBS 5323) Prerequisite: CYBS 3323. This course prepares students to securely develop and operate Internet of Things (IoT) devices considering security and privacy. The course covers concepts of IoT architectures with a focus on security and privacy issues. No student may earn credit for both 4323 and 5323. (F)
- CYBS 4333 Incidence Response Management 3 Credit Hours**
(Slashlisted with CYBS 5333) Prerequisite: CYBS 3123. This course provides a comprehensive treatment of cyber incidents and how to manage them, including understanding attacker motivation, attack methods, and the anatomy of the attacks. Additionally, topics related to incidence readiness, remote triage tools, memory analysis, malware analysis, disk forensics, network intrusion detection tools, and others will be discussed. No student may earn credit for both 4333 and 5333. (Sp)
- CYBS 4473 Network Security 3 Credit Hours**
(Slashlisted with CYBS 5473) Prerequisite: CYBS 3113. The course deals with understanding all aspects of cybersecurity that involve the network. Topics will include network transport-level security, wireless network security, electronic mail security, IP security, firewalls, VPNs, Secure HTTP, person-in-the-middle attack scenarios, and SSL/TLS and SSH (SP). Learn about various tools for analyzing network data at various levels of the TCP/IP stack and operating security operations centers. No student may earn credit for both 4473 and 5473. (F)

- CYBS 4583 Machine Learning for Cybersecurity 3 Credit Hours**
 (Slashlisted with CYBS 5583) Prerequisite: CYBS 3213 and CYBS 3223. Various machine learning concepts, deep learning, time-series analysis, data mining, and other machine-learning concepts. Tools and libraries to analyze data sets, build predictive models, and evaluate the fit of the models. Common learning algorithms, including dimensionality reduction, classification, principal-component analysis, k-NN, k-means clustering, gradient descent, regression, logistic regression, regularization, multiclass data, algorithms, boosting and decision trees. Applies concepts to problems. No student may earn credit for both 4583 and 5583. (Sp)
- CYBS 4883 Cryptography Fundamentals 3 Credit Hours**
 (Slashlisted with CYBS 5883) Prerequisite: CYBS 3213. This course introduces cryptography and its related tools. Specifically, in this course, cryptographic algorithms, protocols, and techniques will be introduced. The course will also introduce students to public key encryption, key exchange protocols, digital signatures, hashing-based encryption, and Data Encryption Standards. This course will also introduce cryptographic implementation in software and web application programming. No student may earn credit for both 4883 and 5883. (F)
- CYBS 4953 Operating and Maintaining Cyber Ranges 3 Credit Hours**
 Prerequisite: CYBS 4473. Students will learn to use and build a cyber range for various assessments of threats and exploits. They will learn to build configurations for different business operations and the formation of red and blue team exercises. Students will have real-world experiences in handling situations without the real-world risk associated with practicing on live production equipment and systems. (Sp)
- CYBS 4963 Cybersecurity Capstone 3 Credit Hours**
 Prerequisite: Senior Standing. Provides the students with an experience to exhibit their knowledge and skills in all areas of cybersecurity. Students will work in small groups to identify and scope a cybersecurity problem and/or challenges. Required to write a proposal about their project and asked to create a work plan to develop solution to solve the problem/challenge. Create a final report and presentation. (Sp)
- CYBS 4990 Independent Study 1-3 Credit Hours**
 1 to 3 hours. Prerequisite: permission of instructor and senior standing. May be repeated once with change of content. Contracted independent study for topic not currently offered in regularly scheduled courses. (F, Sp, Su)
- CYBS 5103 Developing Secure Software 3 Credit Hours**
 (Slashlisted with CYBS 4103) Prerequisite: Graduate Standing. This course covers topics at the intersection of security and software development. This course introduces software development processes and standards for building secure software applications. It discusses secure software life cycle development principles to include security in every phase. It also explores security issues and vulnerabilities in software applications due to a lack of secure software development processes. No student may earn credit for both 4103 and 5103. (F)
- CYBS 5113 Introduction to Cybersecurity Leadership 3 Credit Hours**
 Prerequisite: Graduate standing. This course provides an in-depth exploration of insider threats within organizations and the strategies for managing and mitigating these risks. Students will learn about the motivations behind insider threats, detection methods, prevention techniques, and deterrence mechanisms. (F, Sp, Su)
- CYBS 5123 System Administration 3 Credit Hours**
 (Slashlisted with CYBS 4123) Prerequisite: Graduate Standing. This course provides a comprehensive introduction to system administration. Topics include virtualization, authentication and authorization, directory services, system management, and system security and set up of modern compute and storage clouds, networking systems, file systems, logging and analysis, and networking. Includes topics related to scripting for all administrative functions. Emphasis is placed on enterprise-level systems. No student may earn credit for both 4123 and 5123. (F)
- CYBS 5133 Ethical Hacking and Penetration Testing 3 Credit Hours**
 (Slashlisted with CYBS 4133) Prerequisite: Graduate Standing. This course covers concepts related to ethical hacking and penetration testing methods to assess, exploit, and report security vulnerabilities on systems and their resources. The course will emphasize the ethical application of penetration testing methods and hacking tools. No student may earn credit for both 4133 and 5133. (F)
- CYBS 5203 Cybersecurity Risk Management and Assessment 3 Hours**
 (Slashlisted with CYBS 4203) Prerequisite: Graduate Standing. This course develops competency in information security policies and plans, including controls for physical hardware, software, and networks. The course introduces security risk detection strategies, countermeasures, damage assessment, and control. The course introduces the students to performing information system risk analysis and management audits. Tools for analyzing log files of various kinds will also be introduced. No student may earn credit for both 4203 and 5203. (F)
- CYBS 5213 Behavioral Cybersecurity 3 Credit Hours**
 Prerequisite: Graduate standing. This course explores the interdisciplinary field of behavioral cybersecurity, emphasizing the role of human personality in cybersecurity practices. It aims to address the growing challenges posed by the digital age. Course will examine the application of psychological methods, profiling techniques, and the use of game theory in understanding human behavior. (F, Sp, Su)
- CYBS 5233 Cybersecurity Ethics, Policy, and Law 3 Credit Hours**
 Prerequisite: Graduate standing. This course explores the intersection of ethics, policy, and law within the realm of cybersecurity. Students will engage with case studies, legal frameworks, and ethical dilemmas to critically analyze and navigate the complex landscape of digital security. The goal is to develop a foundation for applying ethical considerations in any organizational structure. (F, Sp, Su)
- CYBS 5243 Threat Hunting and Incident Response 3 Credit Hours**
 Prerequisite: Graduate standing. This course provides an in-depth exploration of threat hunting and incident response in cybersecurity. It moves beyond traditional defensive measures to actively seek out and mitigate novel cyber threats. Students will learn how to plan, execute, and recover from hunts, customize frameworks for specific use cases, and respond to incidents, including ransomware attacks. (F, Sp, Su)
- CYBS 5253 Cybercrime and Cybersecurity 3 Credit Hours**
 Prerequisite: Graduate standing. This course delves into the intricacies of cybersecurity and cybercrime, offering a comprehensive overview of the challenges and strategies associated with protecting digital assets. Students will explore various threats, risk management approaches, and the critical roles of people, processes, and technology in cybersecurity. (F)

CYBS 5293 Introduction to Cloud Computing and Security 3 Credit Hours

(Slashlisted with CYBS 4293) Prerequisite: Graduate Standing. Course covers the concepts behind cloud computing, including storage and computing. We will also learn about virtualization, software as a service, and deployment models. We will learn about cybersecurity risks on cloud infrastructure and countermeasures using access policies, distributed access control, key management, and others. Covers topics in the cloud computing security guidelines set forth in international standards organizations. No student may earn credit for both 4293 and 5293. (Sp)

CYBS 5303 Insider Threat and Risk Management 3 Credit Hours

Prerequisite: Graduate standing. This course provides an in-depth exploration of insider threats within organizations and the strategies for managing and mitigating these risks. Students will learn about the motivations behind insider threats, detection methods, prevention techniques, and deterrence mechanisms. (F, Sp, Su)

CYBS 5323 IoT Security and Privacy 3 Credit Hours

(Slashlisted with CYBS 4323) Prerequisite: Graduate Standing. This course prepares students to securely develop and operate Internet of Things (IoT) devices considering security and privacy. The course covers concepts of IoT architectures with a focus on security and privacy issues. No student may earn credit for both 4323 and 5323. (F)

CYBS 5333 Incidence Response Management 3 Credit Hours

(Slashlisted with CYBS 4333) Prerequisite: Graduate Standing. This course provides a comprehensive treatment of cyber incidents and how to manage them, including understanding attacker motivation, attack methods, and the anatomy of the attacks. Additionally, topics related to incidence readiness, remote triage tools, memory analysis, malware analysis, disk forensics, network intrusion detection tools, and others will be discussed. No student may earn credit for both 4333 and 5333. (Sp)

CYBS 5383 Trust in Artificial Intelligence 3 Credit Hours

Prerequisite: Graduate standing. This course explores the intersection of artificial intelligence (AI), management, and trust, delving into how these elements influence each other in modern organizations. It covers various aspects of trust in AI, including organizational, psychological, technological, and ethical dimensions. The course also examines the role of trust in human-machine interaction, AI's impact on innovation, and reducing costs. (F, Sp, Su)

CYBS 5443 Cyber Threat and Intelligence 3 Credit Hours

Prerequisite: Graduate standing. This course explores the dynamic and complex nature of cyber threats and the role of intelligence in addressing them. It covers the spectrum of threat intelligence, from tactical to strategic levels, and delves into the methodologies and technologies used to gather, analyze, and apply intelligence to enhance cybersecurity. (F, Sp, Su)

CYBS 5453 Cybersecurity in a Cloud Environment 3 Credit Hours

Prerequisite: Graduate standing. This course provides an in-depth look into the multifaceted aspects of cybersecurity within cloud computing environments. Covering fundamental concepts, architecture, software security, risk issues, and life cycle concerns, students will learn how to secure cloud services and infrastructure effectively. (F, Sp, Su)

CYBS 5473 Network Security 3 Credit Hours

(Slashlisted with CYBS 4473) Prerequisite: Graduate Standing. The course deals with understanding all aspects of cybersecurity that involve the network. Topics will include network transport-level security, wireless network security, electronic mail security, IP security, firewalls, VPNs, Secure HTTP, person-in-the-middle attack scenarios, and SSL/TLS and SSH (SP). Learn about various tools for analyzing network data at various levels of the TCP/IP stack and operating security operations centers. No student may earn credit for both 4473 and 5473. (F)

CYBS 5483 Network Security & Resilience 3 Credit Hours

Prerequisite: Graduate standing. This is a course designed to give students a deep understanding of the various aspects of securing computer networks and building resilience. It covers topics ranging from the motivations behind security threats to the technical and procedural steps necessary for ensuring the resilience of networks. (F, Sp, Su)

CYBS 5583 Machine Learning for Cybersecurity 3 Credit Hours

(Slashlisted with CYBS 4583) Prerequisite: Graduate Standing. Various machine learning concepts, deep learning, time-series analysis, data mining, and other machine-learning concepts. Tools and libraries to analyze data sets, build predictive models, and evaluate the fit of the models. Common learning algorithms, including dimensionality reduction, classification, principal-component analysis, k-NN, k-means clustering, gradient descent, regression, logistic regression, regularization, multiclass data, algorithms, boosting and decision trees. Applies concepts to problems. No student may earn credit for both 4583 and 5583. (Sp)

CYBS 5883 Cryptography Fundamentals 3 Credit Hours

(Slashlisted with CYBS 4883) Prerequisite: Graduate Standing. This course introduces cryptography and its related tools. Specifically, in this course, cryptographic algorithms, protocols, and techniques will be introduced. The course will also introduce students to public key encryption, key exchange protocols, digital signatures, hashing-based encryption, and Data Encryption Standards. This course will also introduce cryptographic implementation in software and web application programming. No student may earn credit for both 4883 and 5883. (F)

CYBS 5903 Master's Practicum 3 Credit Hours

Prerequisite: Graduate Standing. The course provides the students with a culminating experience to exhibit their knowledge and skills in all areas of cybersecurity. Students will collaboratively work in small groups to identify and scope a current cybersecurity problem and/or challenge. Students will be required to write a proposal, create a work plan, draft a final report and make a presentation. (Sp)

CYBS 5960 Directed Readings 1-3 Credit Hours

1 to 3 hours. Prerequisite: Graduate standing and departmental permission. Directed readings and/or literature reviews under the direction of a faculty member. May be repeated; maximum credit six hours. (F, Sp, Su)

CYBS 5963 Strategic Planning in Cybersecurity Practicum 3 Credit Hours

Prerequisite: Graduate standing. This capstone course delves into the strategic planning and leadership aspects of cybersecurity. Students will explore the relationship between the business environment and organizational goals, risk management, and protecting information assets. The course will provide tools to build a cybersecurity strategic plan, develop IT security policies, and lead teams in the execution of these plans. (Irreg.)

- CYBS 5980 Research for Master's Thesis 2-9 Credit Hours**
2 to 9 hours. Prerequisite: Graduate Standing and Instructor Permission. Directed research culminating in the completion of the master's thesis. Variable enrollment, permission of instructor required, two to nine hours; maximum credit required for degree, six hours. (F, Sp)
- CYBS 5990 Independent Study 1-3 Credit Hours**
1 to 3 hours. Prerequisite: Graduate standing and permission of instructor. Contracted independent study for a topic not currently offered in regularly scheduled courses. Independent study may include library and/or laboratory research and field projects. May be repeated; maximum credit six hours. (Ireg.)
- DMFG 3003 Introduction to CAD in Digital Manufacturing 3 Credit Hours**
Prerequisite: Junior standing. This course introduces students to CAD principles and digital manufacturing, focusing on SolidWorks and AutoCAD. It covers 2D drafting, 3D modeling, parametric design, GD&T, and CAD-manufacturing integration. Through hands-on projects and industry software, students gain skills in designing, analyzing, and preparing models for production. (F)
- DMFG 3013 Ethics, HR, Environmental, & Safety Policies and Procedures 3 Credit Hours**
Prerequisite: Junior standing. This course explores ethical, HR, environmental, and safety policies in digital manufacturing. Students study professional ethics, regulations, sustainability, and safety standards, including OSHA compliance, environmental assessments, ethical decision-making, HR policies, and risk management. Through case studies and projects, students learn industry best practices for responsible manufacturing. (Sp)
- DMFG 3103 Materials and Processes in Manufacturing 3 Credit Hours**
Prerequisite: Junior standing. This course introduces fundamental materials and manufacturing processes in industry. Students examine metals, polymers, ceramics, and composites, and their influence on methods like forming, machining, and additive manufacturing. Through case studies and projects, they gain insight into processes impacting design and performance. (F)
- DMFG 3203 CAM in Digital Manufacturing 3 Credit Hours**
Prerequisite: Junior standing. This course introduces CAM and its role in digital manufacturing, building on CAD skills. Students learn toolpath generation, machining optimization, and CNC integration, covering 2.5D/3D milling, turning, G-code, and simulation. Using CAM software, they gain skills to convert digital models into physical products. (Sp)
- DMFG 3213 CAD in Digital Manufacturing 3 Credit Hours**
Prerequisite: Junior standing. This advanced course builds on CAD skills, focusing on complex modeling and design for manufacturability in SolidWorks, with some AutoCAD use. Students explore parametric and surface modeling, simulation, automation, and PLM, optimizing designs for manufacturing. Hands-on projects enhance skills for efficient, modern production designs. (Sp)
- DMFG 3303 Industrial Electronics and Controls 3 Credit Hours**
Prerequisite: Junior standing. This course introduces industrial electronics and control systems in manufacturing. Students explore circuits, sensors, actuators, motor control, and PLCs, focusing on signal processing, automation, and communication protocols. Through hands-on projects and simulations, they gain skills in designing and maintaining control systems. (F)
- DMFG 3313 Smart Factory Integration and Automation 3 Credit Hours**
Prerequisite: Junior standing. This course explores smart technologies in manufacturing, focusing on Industry 4.0, automation, IoT, and real-time data for production optimization. Students study sensors, PLC programming, robotics, digital twins, and cybersecurity. Through labs and case studies, they gain experience in managing smart manufacturing systems. (Sp)
- DMFG 3323 Industrial Sensors & Data Acquisition 3 Credit Hours**
Prerequisite: Junior standing. This course provides an in-depth exploration of industrial sensors and data acquisition systems used in manufacturing and automation. Students will learn about sensor technologies, signal conditioning, data collection methods, and real-time monitoring. Key topics include analog and digital sensors, wireless sensor networks, IoT integration, data logging, and industrial communication protocols. Through hands-on exercises and case studies, students will develop practical (Sp)
- DMFG 4103 Advanced Manufacturing Processes 3 Credit Hours**
Prerequisite: Junior standing; DMFG 3103. Building on DMFG 3103, this course explores advanced manufacturing techniques, emphasizing efficiency, automation, and sustainability. Students study machining, non-traditional and additive processes, and Industry 4.0 technologies like AI and digital twins. Through projects and case studies, they gain skills in optimizing systems for performance, quality, and environmental impact. (F)
- DMFG 4113 Additive Manufacturing & 3D Printing 3 Credit Hours**
Prerequisite: Junior standing. This senior course delves into Additive Manufacturing (AM) and 3D Printing, building on prior digital manufacturing studies. It covers materials, processes, design optimization, and applications, including metal/polymer printing, AI control, and sustainability. Through projects and case studies, students gain expertise in AM solutions for industry. (F)
- DMFG 4303 Supply Chain Management in Smart Manufacturing 3 Credit Hours**
Prerequisite: Junior standing. This senior course examines SCM strategies in smart manufacturing, focusing on Industry 4.0, IoT, AI, blockchain, and analytics. It covers real-time tracking, predictive analytics, digital twins, automation, and resilient design, plus sustainability and risk management. Through case studies and projects, students enhance supply chain efficiency and responsiveness in digital contexts. (F)
- DMFG 4903 DMFG Capstone Project 3 Credit Hours**
Prerequisite: Senior standing; SDI 4103. Major team-based software design project to be undertaken in a student's final year of study; project planning, manufacturing process design, system integration, and specification development. Students will collaborate to create innovative manufacturing solutions, leveraging advanced technologies such as additive manufacturing, CNC machining, and Industry 4.0 tools. Written reports and oral presentations in a technical setting will be required. (Sp)
- HIS 3003 Health Information Systems and Applications 3 Credit Hours**
Prerequisite: Junior standing. Surveys the components of modern health information systems, from EHRs and PACS to data warehouses and HIEs. Emphasizes interoperability standards, privacy/security requirements, and leadership challenges. Students learn to evaluate technology adoption barriers, assess staffing needs, and manage organizational resources for effective health IT ecosystems. (F)

- HIS 3013 Medical Terminologies, Vocabularies, and Ontologies** 3
Credit Hours
Prerequisite: Junior standing; HIS 3003. Examines how standardized vocabularies (ICD, CPT, SNOMED CT, LOINC) enable precise data exchange and interoperability. Addresses ontology structures, semantic mapping, and clinical coding. Students perform hands-on mapping exercises to grasp terminology management challenges and ensure accurate, consistent healthcare data. (Sp)
- HIS 3023 Medical Information Retrieval and Digital Knowledge Sources** 3 **Credit Hours**
Prerequisite: Junior standing; corequisite of HIS 3003. Teaches advanced information retrieval, digital library navigation, and systematic literature searching for healthcare. Explores indexing, AI-driven search tools, and best practices for evaluating clinical resources. Students learn to appraise information accuracy, mitigate bias, and use domain-specific databases effectively. (F)
- HIS 3103 Healthcare Organizations: Clinical Roles, Tasks, and Workflows** 3 **Credit Hours**
Prerequisite: Junior standing. Explores healthcare organization structures, funding models, and care delivery processes. Students analyze the roles of clinicians and support staff, map patient-care workflows, and identify improvement areas. Emphasizes communication strategies and inter-professional collaboration to align technology solutions with real-world clinical needs. (F)
- HIS 3403 Healthcare Quality and Patient Safety** 3 **Credit Hours**
Prerequisite: Junior standing. Provides an overview of quality improvement and patient safety, focusing on measurement methods, regulatory requirements, and technology-driven solutions. Students learn to implement CQI frameworks (Six Sigma, Lean), conduct root cause analyses, and propose data-driven strategies to reduce errors and enhance patient outcomes. (F)
- HIS 4203 Clinical Decision Support Systems for Evidence-Based Care** 3 **Credit Hours**
Prerequisite: Junior standing; HIS 3003. Focuses on developing, deploying, and evaluating computerized clinical decision support (CDS). Covers knowledge representation, alerts, predictive models, and integration with clinical workflows. Students practice design principles, stakeholder engagement, and error mitigation, using real-world scenarios to understand how CDS tools enhance clinical decision-making. (Sp)
- HIS 4213 Artificial Intelligence, Natural Language Processing, and Machine Learning for Healthcare** 3 **Credit Hours**
Prerequisite: Junior standing; CYBS 3913. Covers AI fundamentals, machine learning, and NLP in clinical contexts. Explores supervised/unsupervised methods, predictive analytics, ethical considerations, and advanced generative AI. Students build models and critique AI outputs while investigating biases, reliability, and real-world clinical implementation challenges. (F)
- HIS 4303 Telehealth, mHealth, and Distributed Ecosystems** 3 **Credit Hours**
Prerequisite: Junior standing; HIS 3003. Explores remote healthcare delivery, patient monitoring devices, and distributed systems like wearables and smart homes. Addresses telehealth adoption trends, reimbursement challenges, and regulatory compliance. Students apply interoperability principles and evaluate strategies to expand telemedicine access, particularly in underserved communities. (Irreg.)
- HIS 4403 Ethics in Medical Informatics** 3 **Credit Hours**
Prerequisite: Junior standing; HIS 3003. Introduces ethical frameworks guiding healthcare data usage, privacy, informed consent, and AI deployment. Students explore case studies, algorithmic bias, and professional standards. Emphasizes balancing efficiency, safety, and equity in health informatics decisions. (F)
- HIS 4413 Clinical Informatics Policy, Regulations, and Governance** 3 **Credit Hours**
Prerequisite: Junior standing; HIS 3003. Examines HIT policy frameworks, HIPAA/HITECH compliance, interoperability mandates, and auditing. Students analyze policy formation, cybersecurity risks, and governance strategies in clinical informatics. Emphasizes the challenges of data privacy, state/federal regulations, and telehealth oversight. (F)
- HIS 4903 Health Information Systems Capstone** 3 **Credit Hours**
Prerequisite: Senior standing; completion of core courses or instructor permission. Provides a culminating experience where students design, implement, and evaluate a real-world informatics solution. Emphasizes stakeholder engagement, project management, policy compliance, and outcome measurement. Students present final deliverables to industry and faculty for comprehensive feedback. (Sp)
- POLY 1003 Frontiers in Emerging Technologies, First-year Experience** 3 **Credit Hours**
Students explore and apply emerging technologies like artificial intelligence, cybersecurity, and digital manufacturing. Critical thinking and civil discourse are emphasized as students examine the ethical, cultural, and societal impacts of these technologies. This course helps students understand their role as digital citizens, preparing them to contribute positively to industries and their communities. (F, Sp) [V-FYE].
- POLY 1203 Foundations of Programming for Emerging Technologies** 3 **Credit Hours**
This course introduces Python programming fundamentals, focusing on core concepts such as binary computation, problem-solving techniques, and algorithm development. Students will learn about procedural and data abstractions, program design, debugging, testing, and documentation. Key topics include Python-specific data types, control structures, functions, parameter passing, built-in libraries, arrays, and object-oriented programming with inheritance. Laboratory sessions will provide hands-on experience. (Sp)
- POLY 2203 Applied Statistics for Modern Computing** 3 **Credit Hours**
Prerequisite: MATH 1503. This course is an introduction to basic statistical terminology, organization of data, measures of central tendency and dispersion, review of combinations, permutations, and probability, binomial and normal distributions, hypothesis testing, and a variety of other statistical techniques. Bias and Variance will be discussed in the context of model evaluation. This course emphasizes the development of critical statistical thinking skills. (F)
- POLY 2513 Applied Discrete Mathematics for Computing** 3 **Credit Hours**
Prerequisite: MATH 1503. This course is an introduction to the theory of discrete structures with an emphasis on the application of discrete math/structures for problem solving. Topics include combinatorics, relations, functions, computational complexity, recurrences, and graph theory. (Sp)
- SDI 3001 Polytechnic Colloquia I** 1 **Credit Hour**
Prerequisite: Junior standing; May be repeated, maximum credit 2 hours. In this course, students prepare for, attend, and reflect on a range of discussion topics in science and technology. Each week speakers from inside and outside of the University of Oklahoma will be invited to lead relevant discussions on topics in science and technology including ethics, responsibilities, challenges, and societal impacts. The colloquium topics vary from semester to semester. (F, Sp)

- SDI 3103 Programming Languages 3 Credit Hours**
Prerequisite: Junior standing. A study of programming languages from both the theoretical and practical perspectives. A survey of major and developing paradigms and languages is undertaken, including use of specific languages to broaden the student's experience. (F)
- SDI 3123 Algorithms I 3 Credit Hours**
Prerequisite: Junior standing. This course focuses on foundational aspects of algorithms and data structures, emphasizing problem-solving strategies, primitive types, arrays, strings, linked lists, and basic searching and sorting algorithms. Prepares students for technical interviews with an introduction to common interview strategies and simple design problems. (Sp)
- SDI 3143 Mobile Application Development 3 Credit Hours**
Prerequisite: Junior standing. This course provides an introduction to mobile application development. The primary aim of this course is to provide students with a thorough introduction to designing and building native and/or crossplatform apps for mobile devices. The platform, frameworks/libraries, and development tools used in this course vary and are dependent on the current demand in industry. (Sp)
- SDI 3203 Computer Networks 3 Credit Hours**
Prerequisite: Junior standing. This course is designed to provide a thorough grounding in the principles and practices of network infrastructure and communication. This course aligns with the Microsoft MTA Networking Fundamentals Exam 98-366, offering coverage of network topologies, hardware, and protocols. The curriculum not only prepares students for the certification exam but also lays a strong foundation for advanced studies in computer networking. (F)
- SDI 3213 Cloud Computing 3 Credit Hours**
Prerequisite: Junior standing. In this comprehensive course, we delve into the landscape of cloud computing. We cover elements of cloud technology, including architecture, data management, and security. The curriculum is designed to equip students with both theoretical knowledge and practical skills, preparing them for the evolving cloud industry. Emphasis is placed on industry-recognized certifications, ensuring graduates are well-versed in contemporary cloud practices. (Sp)
- SDI 3403 Web Systems Development 3 Credit Hours**
Prerequisite: C S 1213, C S 1321, C S 1323, or C S 1324 or equivalent. In this course, students will immerse themselves in a variety of contemporary web development technologies, focusing on developing web-based systems with object-oriented programming and database management languages. The curriculum emphasizes practical projects in web application development, encompassing web application architecture, design pattern methodologies, relational database structuring, and comprehensive database query techniques. (F)
- SDI 3413 User Interface and Experience (UI/UX) 3 Credit Hours**
Prerequisite: Junior standing. Introduction to fundamental design of the human interface to information systems. Major topics include universal design principles, user research methods, user interface design process, prototyping, and collaboration. This course is designed to prepare students to participate in the design and evaluate information system interfaces from a user-centered design perspective. (Sp)
- SDI 3440 Mentored Research Experience 3 Credit Hours**
0 to 3 hours. Prerequisite: ENGL 1113 or equivalent, and permission of instructor; May be repeated, maximum credit 12 hours. For the inquisitive student to apply the scholarly processes of the discipline to a research or creative project under the mentorship of a faculty member. Student and instructor should complete an Undergraduate Research & Creative Projects (URCP) Mentoring Agreement and file it the with the URCP office. Not for honors credit. (F, Sp, Su)
- SDI 3990 Independent Study 1-3 Credit Hours**
1 to 3 hours. Prerequisite: junior standing and permission of instructor; May be repeated once with change of content, maximum credit 6 hours. Independent study may be arranged to study a subject not available through regular course offerings. (F, Sp, Su)
- SDI 4001 Polytechnic Colloquia II 1 Credit Hour**
Prerequisite: SDI 3001. In this course, students prepare for, attend, and reflect on a range of discussion topics in science and technology. Each week speakers from inside and outside of the University of Oklahoma will be invited to lead relevant discussions on topics in science and technology including ethics, responsibilities, challenges, and societal impacts. The colloquium topics vary from semester to semester. (F, Sp)
- SDI 4103 Software Project Management 3 Credit Hours**
(Slashlisted with SDI 5103) Prerequisite: Junior standing. This course introduces project management techniques and their application to software development. The course will cover waterfall and agile project management approaches and will cover tools and methods of each approach. Students will work in small teams to build an application to develop a database application aimed at solving a typical task applying agile techniques using project management software. No student may earn credit for both 4103 and 5103. (F)
- SDI 4113 Real Time Systems 3 Credit Hours**
(Slashlisted with SDI 5113) Prerequisite: Junior standing. In this course, students explore programming for real-time systems, focusing on development environments, networking principles, device integration, and IoT solutions. This course covers the basics of electronics, device control, sensor usage, and advanced programming techniques for real time systems, preparing students for comprehensive IoT project development. No student may earn credit for both 4113 and 5113. (F)
- SDI 4123 Software Testing and Quality Assurance 3 Credit Hours**
(Slashlisted with SDI 5123) Prerequisite: Junior standing. This course delves into the domain of software testing and quality assurance. It covers an array of topics from test design and automation challenges to specialized testing areas, emphasizing the development of strategies for effective testing within various software delivery models. The curriculum is designed to cultivate a deep understanding of testing principles and their practical applications. No student may earn credit for both 4123 and 5123. (Sp)
- SDI 4133 Algorithms II 3 Credit Hours**
(Slashlisted with SDI 5133) Prerequisite: SDI 3123. Advanced exploration of algorithmic strategies focusing on stacks, queues, binary trees, heaps, hash tables, binary search trees, dynamic programming, greedy algorithms, graphs, and parallel computing. Addresses complex design problems, encouraging the application of theoretical knowledge to real-world scenarios. No student may earn credit for both 4133 and 5133. (F)
- SDI 4213 DevOps - CI/CD 3 Credit Hours**
(Slashlisted with SDI 5213) Prerequisite: Junior standing. This hands-on Development and Operations (DevOps) course delves into the concepts of containerization, orchestration, and Infrastructure as Code using popular tools and platforms. It focuses on practical skills such as continuous integration and deployment (CI/CD), emphasizing security best practices and automated testing. Students will learn to build and deploy to the cloud, demonstrating proficiency in end-to-end development pipelines. No student may earn credit for both 4213 and 5213. (F)

- SDI 4233 Process Automation 3 Credit Hours**
(Slashlisted with SDI 5233) Prerequisite: Junior standing. This course introduces computer system automation principles that leverage computer scripting languages. It covers script writing for automation, troubleshooting, debugging, testing, and configuring development environments. Additionally, the course explores advanced automation concepts such as infrastructure management techniques, container technologies, and cloud deployment strategies. No student may earn credit for both 4233 and 5233. (F)
- SDI 4313 Data Analytics 3 Credit Hours**
(Slashlisted with SDI 5313) Prerequisite: ECON 2843 or equivalent. This course will examine current trends in data science and how it can be used to improve decision-making across different fields, such as business, economics, social and political sciences. Real-world examples will be used to place data science techniques in context and to develop data-analytic thinking. Students will design and realize a data science project using statistical software. No student may earn credit for both 4313 and 5313. (Sp)
- SDI 4403 Advanced Web Systems 3 Credit Hours**
(Slashlisted with SDI 5403) Prerequisite: SDI 3403. This course offers an in-depth exploration of web application development, with a particular focus on Object-Relational Mapping (ORM) and database interactions. It encompasses the foundational principles of environment setup and database management through ORM, emphasizing secure application architecture and API development. The curriculum is designed to impart comprehensive skills for effective deployment strategies in advanced, database-oriented web applications. No student may earn credit for both 4403 and 5403. (Sp)
- SDI 4903 SDI Capstone Project 3 Credit Hours**
Prerequisite: SDI 4103 and senior standing. Major team-based software design project to be undertaken in a student's final year of study; project planning, software requirements analysis, design, and specification. Written reports and oral presentations in a technical setting will be required. (Sp)
- SDI 4990 Independent Study 1-3 Credit Hours**
1 to 3 hours. Prerequisite: permission of instructor and senior standing; May be repeated once with change of content, Maximum credit 6 hours. Independent study may be arranged to study a subject not available through regular course offerings. (F, Sp, Su)
- SDI 5103 Software Project Management 3 Credit Hours**
(Slashlisted with SDI 4103) Prerequisite: Graduate standing. This course introduces project management techniques and their application to software development. The course will cover waterfall and agile project management approaches and will cover tools and methods of each approach. Students will work in small teams to build an application to develop a database application aimed at solving a typical task applying agile techniques using project management software. No student may earn credit for both 4103 and 5103. (F)
- SDI 5113 Real Time Systems 3 Credit Hours**
(Slashlisted with SDI 4113) Prerequisite: Graduate standing. In this course, students explore programming for real-time systems, focusing on development environments, networking principles, device integration, and IoT solutions. This course covers the basics of electronics, device control, sensor usage, and advanced programming techniques for real time systems, preparing students for comprehensive IoT project development. No student may earn credit for both 4113 and 5113. (F)
- SDI 5123 Software Testing and Quality Assurance 3 Credit Hours**
(Slashlisted with SDI 4123) Prerequisite: Graduate standing. This course delves into the domain of software testing and quality assurance. It covers an array of topics from test design and automation challenges to specialized testing areas, emphasizing the development of strategies for effective testing within various software delivery models. The curriculum is designed to cultivate a deep understanding of testing principles and their practical applications. No student may earn credit for both 4123 and 5123. (Sp)
- SDI 5133 Algorithms II 3 Credit Hours**
(Slashlisted with SDI 4133) Prerequisite: SDI 3123 and graduate standing. Advanced exploration of algorithmic strategies focusing on stacks, queues, binary trees, heaps, hash tables, binary search trees, dynamic programming, greedy algorithms, graphs, and parallel computing. Addresses complex design problems, encouraging the application of theoretical knowledge to real-world scenarios. No student may earn credit for both 4133 and 5133. (F)
- SDI 5213 DevOps - CI/CD 3 Credit Hours**
(Slashlisted with SDI 4213) Prerequisite: Graduate standing. This hands-on Development and Operations (DevOps) course delves into the concepts of containerization, orchestration, and Infrastructure as Code using popular tools and platforms. It focuses on practical skills such as continuous integration and deployment (CI/CD), emphasizing security best practices and automated testing. Students will learn to build and deploy to the cloud, demonstrating proficiency in end-to-end development pipelines. No student may earn credit for both 4213 and 5213. (F)
- SDI 5233 Process Automation 3 Credit Hours**
(Slashlisted with SDI 4233) Prerequisite: Graduate standing. This course introduces computer system automation principles that leverage computer scripting languages. It covers script writing for automation, troubleshooting, debugging, testing, and configuring development environments. Additionally, the course explores advanced automation concepts such as infrastructure management techniques, container technologies, and cloud deployment strategies. No student may earn credit for both 4233 and 5233. (F)
- SDI 5313 Data Analytics 3 Credit Hours**
(Slashlisted with SDI 4313) Prerequisite: Graduate standing. This course will examine current trends in data science and how it can be used to improve decision-making across different fields, such as business, economics, social and political sciences. Real-world examples will be used to place data science techniques in context and to develop data-analytic thinking. Students will design and realize a data science project using statistical software. No student may earn credit for both 4313 and 5313. (Sp)
- SDI 5403 Advanced Web Systems 3 Credit Hours**
(Slashlisted with SDI 4403) Prerequisite: Graduate standing. This course offers an in-depth exploration of web application development, with a particular focus on Object-Relational Mapping (ORM) and database interactions. It encompasses the foundational principles of environment setup and database management through ORM, emphasizing secure application architecture and API development. The curriculum is designed to impart comprehensive skills for effective deployment strategies in advanced, database-oriented web applications. No student may earn credit for both 4403 and 5403. (Sp)

SDI 5903 Master's Practicum 3 Credit Hours

Prerequisite: Graduate standing. Major team-based software design project to be undertaken in a student's final year of study; project planning, software requirements analysis, design, and specification. Written reports and oral presentations in a technical setting will be required. (Sp)

Wang	Chenggang	2024	Assistant Professor of Cybersecurity	PhD, University of Cincinnati, 2022
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SDI 5960 Directed Readings 1-3 Credit Hours

1 to 3 hours. Prerequisite: Graduate standing and departmental permission. Directed readings and/or literature reviews under the direction of a faculty member. May be repeated; maximum credit six hours. (F, Sp, Su)

SDI 5980 Research for Master's Thesis 2-9 Credit Hours

2 to 9 hours. Prerequisite: Graduate Standing and Instructor Permission. Directed research culminating in the completion of the master's thesis. Variable enrollment, permission of instructor required, two to nine hours; maximum credit required for degree, six hours. (F, Sp)

SDI 5990 Independent Study 1-3 Credit Hours

1 to 3 hours. Prerequisite: Graduate standing and permission of instructor. Contracted independent study for a topic not currently offered in regularly scheduled courses. Independent study may include library and/or laboratory research and field projects. May be repeated; maximum credit six hours. (Irreg.)

Faculty

The faculty at OUPI bring a rich blend of industry and academic research experience in communications, automotive, heavy equipment control systems, biotech, law enforcement, first-responder and defense electronics, fintech, and high-end computing. Research interests of the faculty stretch across many applications and industries in cybersecurity, software development and integration, artificial intelligence, and digital manufacturing.

Last Name	First/Middle Name	Middle init.	OU Service start	Title(s), date(s) appointed	Degrees Earned, Schools, Dates Completed
Beattie	Matthew	J	2023	Adjunct of Applied Artificial Intelligence	PhD, University of Oklahoma, 2022
Butt	Ahmed	Ashraf	2024	Assistant Professor of Applied Artificial Intelligence	PhD, Purdue University 2023
Freeze	Christopher		2023	Assistant Professor of Cybersecurity	PhD, University of Oklahoma 2023
Hassell	John		2023	Associate Professor of Software Development & Integration	PhD, University of Oklahoma 2005
Jung	Sungbo		2024	Assistant Professor of Cybersecurity	PhD, University of Louisville 2024
MacDonald	Gregory	G.	2024	Associate Professor of Applied Artificial Intelligence	PhD, University of Oklahoma 2012
Reed	Teri	K	2023	Professor and Director of OUPI	PhD, Arizona State University 1999
Riaz	Muhammad Sajid		2024	Assistant Professor of Software Development & Integration	PhD, University of Oklahoma 2024
Roller	Chad	B	2024	Assistant Professor of Software Development & Integration	PhD, Rice University 2005