APPLIED COMPUTING AND INFORMATICS (ACMP)

Applied Computing and Informatics Undergraduate Courses

ACMP 1100 INTRODUCTION TO INFORMATION SECURITY (3 credits)

This course emphasizes our current dependence on information technology and how its security in cyberspace (or lack thereof) is shaping the global landscape. Several historical and contemporary global events that have been influenced by the exploitation of information technology motivates topics on cyber crime, malware, intrusion detection, cryptography, among others, and how to secure one's own data and computer system. Several aspects of this course are geared towards developing an understanding of the "cyberspace" as a new medium that breaks all geographical boundaries, while highlighting noticeable influences on it from social, political, economic and cultural factors of a geographical region. (Cross-listed with CYBR 1100). **Distribution:** Global Diversity General Education course

ACMP 1200 HUMAN-CENTERED COMPUTING (3 credits)

The human condition is one of the most studied, yet least understood phenomena. These days, nearly every modern human experience is mediated by technology. As humans increasingly interact with one another and non-human artificial intelligences, our ideas and conceptualizations of the human condition are shifting towards a form of posthumanism. In this class, students will use modern human-centered computing techniques to explore the posthumanist "techno-human condition" (Sarewitz and Allenby) and develop computational artifacts that are human-centered. There are no prerequisites for the course and students need nothing but their own curiosity to enter.

Distribution: Social Science General Education course

ACMP 1300 DIGITAL HEALTH AND BIOLOGICAL SYSTEMS (3 credits)

This course is an introduction to how computing and technology can be applied to human health and biological systems in an interdisciplinary setting. Students will learn to discern between computing specializations such bioinformatics and health informatics. The course will explore the application of computing to health, life sciences, and agriculture in both current and historical contexts, and how these applications impact society. Topics covered include bioinformatics, health informatics, user experience and design, data security and privacy, and more. (Cross-listed with BIOI 1000).

Distribution: Natural/Physical Science General Education course

ACMP 2000 DATA ANALYSIS AND MACHINE LEARNING (3 credits) This course introduces students to the principles and practices of data analysis using modern tools and techniques. Students will learn how to use statistical and computational methods to analyze large data sets and derive insights and knowledge from data. The course covers data visualization, data cleaning and preparation, exploratory data analysis, statistical inference and foundational machine learning concepts. Students will also learn how to use programming languages and tools such as Python or R to manipulate, transform, and analyze data. The course includes handson projects and case studies to provide practical experience and develop critical thinking skills for solving real-world data problems. By the end of the course, students will be able to analyze and interpret complex data sets, communicate findings effectively, and make data-driven decisions. **Prerequisite(s):** CIST 1600 or CIST 1400

ACMP 2100 FUNDAMENTALS OF SOFTWARE AND HARDWARE CONSTRUCTION (3 credits)

From smart home switches, voice controllers, and media casting devices to embedded sensors in infrastructure and commercial buildings that control lights, bridges, and traffic monitors, devices are everywhere in the modern world. Those devices have embedded controllers that specifies what they do and connect to more powerful software elsewhere, usually on the cloud. In this course, we will strip away the layers of complexity and examine the foundations of how hardware (devices) and software (code and data) talk to and interact with one another. Students will learn to write code that reads from sensor inputs and responds with actions that affect the environment using actuation hardware like lights or motors. This course is hands on and presumes students have a basic familiarity with programming concepts. **Prerequisite(s):** CIST 1600 or CIST 1400

ACMP 2220 APPLIED IT INNOVATION (3 credits)

The course extends the concepts learned in the Introduction to IT Innovation course and focuses on market dynamics and monetizing innovations. It moves past idea generation and focuses on identifying and gathering resources, innovation implementation, sustainable innovation models and how ideas can be monetized. The goal is for students to take their original ideas from concept to initial implementation with thoughts towards commercialization. Upon completing the course, students will have created at least a rudimentary implementation of an original idea and have a defensible plan for how the idea can be monetized.

Prerequisite(s): ACMP 1110/ITIN 1110 & CIST 1400. Not open to nondegree graduate students.

ACMP 2400 DEVOPS AND PLATFORM ENGINEERING (3 credits)

DevOps, a portmanteau moniker short for software development and IT operations, is a collaborative methodology that enables faster and more reliable software delivery by combining development and operations activities into a single lifecycle. Platform Engineering is the process of designing, building, and maintaining toolchains and infrastructure that supports applications. In this course, students will learn how DevOps practices and methodologies, like build automation and continuous integration, can be used to improve software delivery and quality. Students will also develop skills focused on deploying, managing, and testing applications using cloud-based platforms, such as Amazon Web Services (AWS), Microsoft Azure, or Google Cloud Platform (GCP). The course will also feature an overview of relevant agile techniques for incremental delivery and hands-on labs with tools such as Docker, Jenkins, Git, and more.

Prerequisite(s): CIST 1600 or CIST 1400

ACMP 2900 SPECIAL TOPICS IN APPLIED COMPUTING AND INFORMATICS (3 credits)

This course is designed to acquaint students with issues which are current to the field or emerging trends in Applied Computing and Informatics. Topics will vary across terms. This course may be repeated, but no topic may be taken more than once.

Prerequisite(s): Permission of instructor. Additional prerequisites may be required for particular topic offerings.

ACMP 2990 IT INNOVATION SYMPOSIUM (1 credit)

The seminar exposes students to information technology innovators from multiple industries and varied backgrounds. It teaches the practical aspects of IT Innovation from those that have done it and are doing it in both research and practice. The purpose is to cause students to reflect on applying innovation to the real-world, connect them to the innovation community and to equip them with best practices and tools to make their innovations a reality.

Prerequisite(s): Enrollment in the IT Innovation Major or IT Innovation Minor. Not open to non-degree graduate students.

ACMP 3100 MUSIC INFORMATICS (3 credits)

Surveys the use of digital music data in the study, composition, performance, analysis, storage, and dissemination of music. Various computational approaches and technologies in music informatics including music information retrieval will be explored and implemented by students. (Cross-listed with MUS 3100).

Prerequisite(s): Successful completion of one of the following three courses satisfies the prerequisite requirement: CIST 1300 or MUS 3170 or MUS 3180. Not open to non-degree graduate students.

ACMP 3180 ELECTRONIC MUSIC PRODUCTION (3 credits)

An exploration of the potentials of electronic music. Concepts of electronic music are presented through the use of a computer, software, and appropriate hardware. Students create assignments that demonstrate the application of basic techniques.

ACMP 3200 DATA STRUCTURES AND ALGORITHMS FOR APPLIED COMPUTING AND INFORMATICS (3 credits)

This course focuses on data structures and algorithms for applied computing. Students with non-CS backgrounds will learn how to abstract and reduce real-world problems of applied computing to data models and computational challenges, and how to efficiently, in terms of time and space, solve the challenges.

Prerequisite(s): CIST 1600

ACMP 3330 DESIGN METHODS AND PROTOTYPING (3 credits)

This course will cover elements and principles of excellent product design and development. The history of design will be reviewed and overarching tenets of design will be introduced. The course will particularly focus on innovation and students will be expected to develop an original concept and create quality designs and low-fidelity prototype implementations of their unique idea. The proposed solutions must be novel and meet a real-world market need. This course will be hands-on and will examine developmental models for innovation.

Prerequisite(s): ACMP 2220 or ITIN 2220. Not open to non-degree graduate students.

ACMP 3400 APPLIED BIOINFORMATICS (3 credits)

This course will provide students with the practical skills needed for the analysis of -omics data. Topics covered will include biological databases, molecular biology tools (e.g., primer design, contig assembly), gene prediction and mining, database searches, genome comparison, sequence alignments, phylogenetic inference, gene expression data analyses, functional annotation of protein sequences, protein structure and modeling. Specialized software (e.g., Vector NTI) and widely used webbased computation tools (e.g.., Entrez, BLAST, ClustalX, Phylip, PyMOL, and SwissPDBviewer) will be illustrated. Multiple approaches for solving particular problems will be presented. (Cross-listed with BIOI 3000). **Prerequisite(s):** BIOI 1000 and either CIST 1400 or CIST 1600

ACMP 4000 SPECIAL TOPICS IN IT INNOVATION (3 credits)

This course is designed to acquaint students with issues which are current to the field or emerging trends in the IT Innovation area. Topics will vary across terms. This course may be repeated, but no topic may be taken more than once. (Cross-listed with HCC 8006).

Prerequisite(s): Permission of instructor. Additional prerequisites may be required for particular topic offerings.

ACMP 4090 MANAGING COLLABORATIVE ENGAGEMENT (3 credits)

This course will provide students with the opportunity to develop knowledge and strategies for leading teams, enhancing collaboration, building consensus, problem solving in teams, facilitating group processes, and designing collaborative workspaces. (Cross-listed with BSAD 8096, MGMT 4090, MGMT 8096, SCMT 4090).

Prerequisite(s): Junior standing or permission of instructor. Not open to non-degree graduate students.

ACMP 4260 USER EXPERIENCE DESIGN (3 credits)

User experience (UX) design is concerned with the application of usercentered design principles to the creation of computer interfaces ranging from traditional desktop and web-based applications, mobile and embedded interfaces, and ubiquitous computing. This course provides indepth, hands-on experience with real world application of the iterative user-centered process including contextual inquiry, task analysis, design ideation, rapid prototyping, interface evaluation, and reporting usability findings. (Cross-listed with CSCI 4260, CSCI 8266, HCC 8266). **Prerequisite(s):** Required: C- or better in CIST 2500 and junior standing, or by permission of instructor. Recommended: C- or better in CSCI 4250 or ACMP 3330/ITIN 3330.

ACMP 4360 METAVERSE INNOVATIONS (3 credits)

Recent technological breakthroughs across computing disciplines are laying the foundation for a paradigm shift in how we interact with and relate to digital technology. The metaverse is a term that is helpful in coalescing these divergent concepts into a single word that symbolizes a future where the physical and virtual worlds are blurred beyond distinction. By means of disruption brought about by the advent of the computer, the internet, and personal computing devices, the enormity and impact of the metaverse across every aspect of human civilization will be unprecedented. The future of work, the economy, and the fundamental social fabric that underpins it all will inevitably be transformed. This course provides students the opportunity understand the technological foundations of the metaverse and equip with the tools and knowledge to be innovators in this space across academic disciplines and economic sectors. (Cross-listed with HCC 8366).

ACMP 4500 INDEPENDENT STUDIES (1-3 credits)

A variable credit course for the junior or senior who will benefit from independent reading assignments and research type problems. Independent study makes available courses of study not available in scheduled course offerings. The student wishing to take an independent study course should find a faculty member willing to supervise the course and then submit, for approval, a written proposal (including amount of credit) to the IT Innovation Undergraduate Program Committee at least three weeks prior to registration.

Prerequisite(s): Written permission required.

ACMP 4580 CAPSTONE (3 credits)

This capstone course serves as the culminating experience for students in Cybersecurity or Applied Computing and Informatics. Students choose among three pathways: the Security Maker Path, where they design, build, and secure a new system or significant component, producing artifacts such as design documentation, code, and testing results; the Security Breaker Path, where they rigorously evaluate an existing product or system using system, network, and/or software testing methods, generating artifacts such as reversed design documents, vulnerability analyses, test cases, scans, and an overall systems posture analysis report; and the Applied Computing Path, focusing on design, development, and innovation artifacts in areas such as software development, data analytics, informatics solutions, and/or biomedical areas. Most projects will include a communityengaged component, enabling students to tackle real-world challenges and contribute positively to the community. This course is ideally taken in the final semester of your degree. (Cross-listed with CYBR 4580). Prerequisite(s): Senior standing in Cybersecurity or Applied Computing and Informatics. Not open to non-degree graduate students.

ACMP 4720 INNOVATION VENTURES (3 credits)

This team-based course provides students with the opportunity to practice the basic tools of business discovery and validation. Concepts and techniques in innovation, entrepreneurship, and strategy will be used to aid students in the venture creation process. Important considerations impacting the viability of the venture post formation will also be explored. Practical real-world experimentation is the central component of the course and will help students to conceive, develop, and launch their own innovative ventures. (Cross-listed with BSAD 8726, HCC 8256, ENTR 4720, ENTR 8726, MGMT 4720, MGMT 8726, MKT 4720, MKT 8726).

Prerequisite(s): ACMP 1110/ITIN 1110 and junior standing or above or by instructor permission.

ACMP 4860 BIOINFORMATICS ALGORITHMS (3 credits)

The main objective of this course is to provide an organized forum for students to understand the foundations of algorithmic design and analysis in the context of health and biological data. The course will present fundamental concepts in algorithms (exhaustive, greedy, graph, heuristic, and more) and explore how those concepts extend to bioinformatics and related fields, such as biomedical informatics, and health informatics. Students will learn about historical context of these algorithms and how they were pivotal in forming more complex modern approaches, and will explore advanced algorithms in their area of interest. Students will also exercise their programming skills with the opportunity to implement and apply bioinformatics algorithms to real data, so to better grasp the technical components of algorithmic design and analysis. (Cross-listed with BMI 8866, BIOI 4860).

Prerequisite(s): ACMP 3200 or CSCI 3320

ACMP 4880 SYSTEMS SIMULATION AND MODELING (3 credits)

The course provides an introduction to the modeling and simulation with special emphasis on decision-theoretic models and rational decision-making. The ability to make good decisions is key to individuals and organizations and studying, understanding and improving decisions is vital to success. Students are given a background into systematic decision-making processes, and then are introduced to formal methods for decision modeling and analysis. Building on these foundational models, students learn how to perform process modeling and optimization. Finally, the course concludes with a look at psychological biases and traps that may affect decision-makers. (Cross-listed with ISQA 4880).

Prerequisite(s): CIST 1400, CIST 2500, or equivalent.

ACMP 4950 INTERNSHIP IN APPLIED COMPUTING AND INFORMATICS (1-3 credits)

This course provides students with an opportunity to apply and further develop their knowledge and skills in a practical environment outside of academia. Internships give students professional work experience and exposure to the challenges and opportunities faced by professionals in the workplace.

Prerequisite(s): Junior/Senior standing and permission of School of interdisciplinary Informatics Director. Not open to non-degree graduate students.