CEN3721
Introduction to Human-Computer Interaction
Credits:3

Course Prerequisites

COP2047 or COP2210 or COP 2250

Official Catalog Course Description

Fundamental concepts of human-computer interaction, cognitive models, user-centered design principles, user experience design (UXD), GenAI co-creation, emerging technologies, and evaluation. Prerequisite: COP 2047

Course Outcomes

Static across all sections

Outcome (Bloom's Taxonomy)	Degree Outcome(s)	ABET Topic(s)
1. Apply the essentials of computer system design. [Apply, C3]	**B* 1**	**PDGM**
2. Examine human-centered computing concepts and principles. [Analyze, C4]	**B* 2**	**UE**
3. Apply principles and practices of interactive system design. [Apply, C3]	**B* 4**	**PDGM, UE, WEB**
4. Recognize the human information processing mechanisms. [Remember, C1]	**B* 1**	**UE**
5. Employ computer interaction design for single user interaction. [Apply, C3]	**BS-IT 6, BS-CY 6**	**UE, EXP, CROSSCUT**
6. Employ techniques of interactive design to ensure high usability. [Apply, C3]	**B* 2**	**UE, EXP**
7. Analyze the psychological foundations for interactive system design of the future. [Analyze, C4]	**B* 4**	**UE, EXP**

8. Analyze the effect of interactive design on security features, privacy, and trust of computer systems. [Analyze, C4]	**BS-IT 6, BS-CY 6**	**PDGM, UE, SYS, DATA, SW, ORGZ**
9. Explain the transformation of interaction design practices through generative AI enhancing human–AI collaboration. [Evaluating, C5]		**PLAT, UE, EXP**

Textbook and Course Materials

- About Face 4.0: The Essentials of Interactive Design, Cooper, Reimann, Noessel, Cronin, Wiley, 4th edition, 2014, ISBN: 9781118766576. [Required]
- Designing with the Mind in Mind: Simple Guide to Understanding User Interface Design Guidelines, Johnson, Elsevier, 3rd edition, 2020, ISBN: 9780128182024. [Optional]
- Interaction Design Beyond Human Computer Interaction, Sharp, Preece, Rogers. Wiley, 5th edition, 2019, ISBN: 978-1-119-54725-9 [Required]

Curriculum: Topics and Required Readings

Week	Topic and Required Reading	Course Outcome(s)	Cred Hrs	Lec Hrs*

1	• Essential Interactive Design System
	  • Varieties of interactive Systems
	  • Framework for design
	  • Skills of the interactive systems designer
	  • Importance of human-centered computing
		1,2	0.19	2.5

2	• People Activities and Contexts
	  • Accessibility, Usability, Acceptability, Engagement
	  • Design Principles
		1,2	0.19	2.5

3	• Understanding People 1: Introduction to cognitive psychology and human information processing
	  • Seven-stage activity
	  • Memory
	  • Attention
	  • Visual perception
		2,4	0.19	2.5

4	• Gestalt laws of perception
	  • Depth perception
	  • Color
	  • Mental models
	  • Virtual reality
		2,4	0.19	2.5

5	• Supporting Single User Interaction
	  • User interfaces
	  • Graphical user interfaces
	  • Input devices
	  • Output devices
	  • Multimodal Human-Computer Interfaces
		2,5	0.19	2.5

6	• User Experience Design (UXD)
	  • User Experience
	  • User Experience Design
	  • UX Framework
	  • Usability
	  • Cross Channel UX
		4,6	0.19	2.5

7	• UXD Process
	  • Experience Design
	  ▪ Conceptual Model
	  ▪ Factors
	  ▪ Interfaces as Priority
	  • UXD Direction
	  • General and Mobile UX Design
		4,6	0.19	2.5

8	• Activities and Contexts of Interactive Systems Design
	  • Scenarios
	  • Requirements
	  • Prototyping
	  • Evaluation
		6,8	0.19	2.5

9	• Conceptual and Physical Design
	  • Security requirements
	  • Design Process for Digital Products
		6,8	0.19	2.5

10	• Psychological Foundations
	  • Memory, attention, and making mistakes
	  • Hearing and Haptics
		4,7	0.19	2.5

11	• Affective Computing and Pleasure • Intelligent User Modeling	4,7	0.19	2.5

12	• Human-GenAI Interaction and Co-Creation
	  • Designing interfaces for co-creation
	  • Designing Explainable (XAI) and Trustworthy Gen AI Interfaces
	  • Adaptive and Personalized UX with GenAI
	  • Prompt Engineering in UX Design
		6,8	0.19	2.5

13	• Visual metaphors for AI reasoning • Usability, privacy, trust, security and ethics in AI collaboration	6,8	0.19	2.5
14	• Case studies: ChatGPT, Copilot, Bard UX patterns/others • AI Assistants, Robotics, and Multimodal Interfaces	6,8	0.19	2.5

15	• Techniques for Interactive Systems Design and Evaluation
	  • Interaction Design Implementation
	  • Contextual Design, interview and work modeling
	  • Task Analysis
	  • Generic techniques and current issues
		6,7,8	0.19	2.5

16	• Software characters, intelligent agents and special contexts • Design techniques used to support secure computing • GenAI based Usability Testing	6,7,8	0.19	2.5

Potential Grading Criteria

Assessment	Number	Course Outcome	Weightage (%)
Quiz	1	1,2,3,4	10%
Midterm Test	1	1,2,3,4	20%
Assignment	2	3,5,6,9	15%
Project	1	3,5,6,7,8,9	25%
Final Examination	1	1,2,3,4,7,8	30%

Grading Scale

Letter Grade	Range	Letter Grade	Range	Letter Grade	Range
A	95 – 100	B	83 – 86.99	C	70 – 76.99
A-	90 – 94.99	B-	80 – 82.99	D	60 – 69.99
B+	87 – 89.99	C+	77 – 79.99	F	0 – 59.99

Reference: Degree Outcomes

KF-SCIS has streamlined degree outcomes across both SACS and ABET. The list of degree outcomes, by degree, can be summarized by the following table:

ID	Degree Outcome
B* 1	Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
B* 2	Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
B* 3	Communicate effectively in a variety of professional contexts.
B* 4	Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
B* 5	Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
BS-CS 6	Apply computer science theory and software development fundamentals to produce computing-based solutions.
BA-CS 6	Apply software development fundamentals to produce computing-based solutions.
BS-CY 6	Apply security principles and practices to maintain operations in the presence of risks and threats.
BS-DS 6	Apply theory, techniques, and tools throughout the data science lifecycle and employ the resulting knowledge to satisfy stakeholders' needs.
BS-IT 6	Use systemic approaches to select, develop, apply, integrate, and administer secure computing technologies to accomplish user goals.
BA-IT 6	Use systemic approaches to select, integrate, and administer secure computing technologies to accomplish user goals.
MS-CS 1	Identify and apply fundamental theories to solve problems within the field of computing.
MS-CS 2	Design and implement significant theoretical results that improve efficiency of computing solutions.
MS-CS 3	Accurately analyze the complexity of algorithms using rigorous mathematical techniques.
MS-CY 1	Apply knowledge of access control and network security to properly authenticate a user.
MS-CY 2	Build security properties using block ciphers and encryption modes.
MS-CY 3	Describe public-key encryption systems and their security properties.
MS-DS 1	Analyze and visualize a dataset using modern toolkit(s).
MS-DS 2	Communicate effectively within the field of data analytics (oral).
MS-DS 3	Communicate effectively within the field of data analytics (written).
MS-IT 1	Design, implement and evaluate network security and encryption protocols.
MS-IT 2	Recall, recognize and identify integral components of computer-based information systems.
MS-IT 3	Create valid software models using well-defined software modeling languages and design principles.
PhD 1	Apply broad, fundamental and in-depth knowledge of computer science to make a new contribution to the field.
PhD 2	Communicate effectively within the field of computer science (oral).
PhD 3	Communicate effectively within the field of computer science (written).

** is a wildcard, i.e. B* means this outcome is used across all Bachelor's degrees.*

*When referencing an outcome in the Course Outcomes section, please reference it by ID (i.e. B*2 or MS-CS 1).*

Reference: ABET Topics

ABET enforces that a certain set of topics be covered by an accredited degree, with a specific number of credit hours.

Some topics are general, and applicable across all or multiple accredited computing degrees:

TECH	All BS	Techniques, skills and tools necessary for computing practice
SEC	All BS	Principles and practices of security and privacy in computing
IMP	All BS	Local and global impacts of computing solutions on individuals, organizations, and society
PROJ	BS-CS, BS-DS and BS-IT	Major project (requires integration/application of knowledge in earlier coursework)
ADV	BS-CY, BS-DS and BS-IT	Advanced topics that build on fundamentals
SWEG	BS-CS and BS-IT	Software development
NTWK	BS-CS and BS-IT	Network and communication
INFO	BS-CS and BS-IT	Information management

Some are specific to each computing degree. These are broken down below.

BS-CS

ALG	Algorithms and complexity
THEO	Computer science theory
PL	Concepts of programming languages
GPL	General-purpose language
ARCH	Computer architecture/organization
OS	Operating systems
PAR	Parallel and distributed computing
CBS	Computing-based systems

BS-CY

CROSSCUT	Cross-cutting concepts (confidentiality, integrity, availability, risk, adversarial/systems thinking)
DATA	Data security
SW	Software security
COMP	Component security
CONN	Connection security
SYS	System security
HUMAN	Human security
ORGZ	Organizational security
SOC	Societal security

BS-DS

ACQ	Data acquisition and representation
MGMT	Data management
PREP	Data preparation and integration
ANAL	Data analysis
MODEL	Model development and deployment
VIZ	Visualization and communication of knowledge obtained from data
ETHICS	Data ethics (legitimate use, algorithmic fairness)
GOV	Governance (privacy, security, stewardship)
MATH/STAT	Applied stats/math (inference, modeling, linear algebra, probability, optimization)
COMP	Computing (including data structures and algorithms)
APPL	At least one application area

BS-IT

INFO	Information management
INTEG	Integrated systems
PLAT	Platform technologies
PDGM	System paradigms

UE	User experience design
WEB	Web and mobile systems
EXP	Experiential learning appropriate to the program

When referencing an outcome in the Course Outcomes section, please reference it by ID (i.e. TECH or SWEG).