

HUMAN CENTERED DESIGN AND ENGINEERING (HCDE)

Course Descriptions

HCDE 501 Human Factors and Ergonomics 3 Credit Hours

This course is designed to provide an understanding of ergonomics as a science and process, with an emphasis on people at work. Discussion of ergonomic methods for measurement, assessment, and evaluation, with major topics including manual materials handling, cumulative trauma disorders, environmental stresses, and safety issues. (F,W)

Restriction(s):

Can enroll if Level is Rackham or Graduate

HCDE 510 Foundation of HCDE 3 Credit Hours

Full Course Title: Foundation of Human-Centered Design and Engineering
This course introduces human-centered design principles and process. Students learn to apply the process and principles to generate innovative design solutions. Topics include empathy, defining design problem, ideation, emotional design, product prototyping and testing. A semester long team based project allows students to apply classroom learnings to real life design problem. (F)

Restriction(s):

Can enroll if Level is Rackham or Graduate

HCDE 518 Human-Centered AI and Human-AI Teaming 3 Credit Hours

This graduate-level course explores the principles and practices of Human-Centered Artificial Intelligence (HCAI) and effective Human-AI collaboration. Students will examine the dynamics of human-AI interaction, focusing on user-centered design, ethical considerations, and the cognitive challenges associated with AI technologies. Through research, practical projects, and simulations, participants will design and evaluate AI systems that prioritize human needs and values, preparing them to engage critically with the evolving landscape of AI technologies in various domains. This course is not solely focused on AI development; rather, it centers on designing UX and systems for effective collaboration between AI and humans. Depending on their skill levels, students may utilize pseudo-AI for their projects to facilitate this learning experience.

Restriction(s):

Can enroll if Class is Graduate

HCDE 520 Research Methods in HCDE 3 Credit Hours

Full Course Title: Research Methods in Human-Centered Design and Engineering
This course surveys qualitative and quantitative research methods in human-centered design and engineering. Different data collection and measurement techniques are covered for different types of data, including subjective, behavioral, and physiological data. Human subject involved experiment design and introduction to basic statistics are also be covered in this course. Other topics include cognitive task analysis, physiological computing in emotional design and sentiment analysis in user needs elicitation process. Students learn to formulate research questions and hypotheses, design and conduct a research study, and present research results through various case studies. (W)

Restriction(s):

Can enroll if Level is Graduate or Rackham or

HCDE 530 Information Visualization 3 Credit Hours

This course introduces information visualization techniques and process which produce effective visualization and help people understand and analyze data. Topics include basics of information visualization, including its history and necessity, human aspects to understand how human perceives visual stimuli, considerations to present data, strategic techniques to summarize and display information, and evaluation of information design. (W, S).

Restriction(s):

Can enroll if Level is Rackham or Graduate

HCDE 540 Integrated Design Thinking and Implementation in Business 3 Credit Hours

This course introduces the business implications of using Human-Centered Design (HCD) skills/tools to drive Integrated problem solving. The course covers the “whys and hows” of each topic with an opportunity to practice the application during in class exercises and projects. The major topics of the course are business-related integrated thinking approaches, including practical applications on how to select and apply appropriate methods to successfully progress through the framework. The course includes case studies and in class workshops. Discussions with industry experts are utilized to supplement course elements as required. A semester-long project is used that requires students to apply the HCD skills to drive an integrated problem solving in the context of related businesses. (W).

Prerequisite(s): HCDE 510

HCDE 590 Capstone Project I 2 Credit Hours

Students form project teams, develop capstone topics, initial concepts, deliverables, schedules and necessary pilot study for the HCDE capstone project. (F,W)

Prerequisite(s): HCDE 520 and IMSE 577 and HCDE 501

Restriction(s):

Can enroll if Level is Graduate

Can enroll if College is Engineering and Computer Science

HCDE 591 Capstone Project II 2 Credit Hours

Students, working in teams under the supervision of individual faculty members, integrate and apply knowledge acquired in various courses of the HCDE program to a design problem of their choosing. (F,W)

Prerequisite(s): HCDE 590

Restriction(s):

Can enroll if College is Engineering and Computer Science

HCDE 699 Master's Thesis Project 1 to 7 Credit Hours

Graduate students electing this course, while working under the general supervision of a member of the department faculty, are expected to plan and conduct the work themselves, to submit a thesis for review and approval, and to present an oral defense of the thesis. Students must satisfactorily complete 7 credit hours in HCDE 699, but these hours may be spread over more than one term. Graduate standing or special permission. (YR).

Restriction(s):

Can enroll if Level is Graduate

Can enroll if College is Engineering and Computer Science

Can enroll if Major is

*An asterisk denotes that a course may be taken concurrently.

Frequency of Offering

The following abbreviations are used to denote the frequency of offering: (F) fall term; (W) winter term; (S) summer term; (F, W) fall and winter terms; (YR) once a year; (AY) alternating years; (OC) offered occasionally