

# HUMAN CENTERED DESIGN AND ENGINEERING

## About the Program

MS in HCDE is 31 semester hours graduate degree designed for students who want to pursue leadership roles in user experience research and design and /or explore, extend, and integrate theoretical and practical issues in design using human centered approach. The proposed program also addresses strong need in industry for highly qualified individuals who can research, identify, document and translate user requirements and needs, generate creative ideas, implement and evaluate the products or services in a scientific way.

MS in HCDE is an interdisciplinary program offered by the Department of Industrial and Manufacturing Systems Engineering in the College of Engineering and Computer Science with the participation of the Department of Behavioral Sciences in the College of Arts, Science and Letters at the University of Michigan-Dearborn.

Human centered design related jobs are on the rise and appear under various titles, such as user experience designer, user interface designer, interaction designer, usability analyst, and product designer.

## Program Goals

- Provide knowledge to research, explore, extend, and integrate theoretical and practical issues in design using human centered approach.
- Provide students with the ability to function in multidisciplinary teams and develop innovative solutions to real life design problems.
- Prepare students for the carrier opportunities in human centered/ experience design.

## Curriculum Requirements

Code	Title	Credit Hours
<b>Core Courses (16 credits)</b>		
HCDE 501	Human Factors and Ergonomics	3
HCDE 510	Foundation of HCDE	3
HCDE 520	Research Methods in HCDE	3
HCDE 590	Capstone Project I	2
HCDE 591	Capstone Project II	2
IMSE 577	Human-Computer Interaction	3

## Concentration Requirements (9 credits)

A minimum of 9 credit hours form the two concentration areas (A) and (B) listed below. All three courses must be taken from one concentration.

### A. User Experience Design:

Focuses on how to balance user's needs with business objectives and technology constraints.

Code	Title	Credit Hours
HCDE 530	Information Visualization	3
MKT 515	Marketing Management	3
MKT 620	Understanding Customers	3
PSYC 561	Learning and Memory	3
PSYC 575	Bio Foundations of Health Psyc	3
PSYC 563	Sensation and Perception	3
ANTH 570	Doing Anthropology	3

### B. Design and Manufacturing

Focuses on how to design and build human-centered products with consideration of materials and manufacturing constrains.

Code	Title	Credit Hours
IMSE 545	Vehicle Ergonomics I	3
IMSE 548	Res.Meth.Human Fctrs/Ergonomic	3
IMSE 561	Tot Qual Mgmt and Six Sigma	3
IMSE 586	Big Data Aanal & Visuliztn	3
IMSE 593	Vehicle Package Engineering	3
EMGT 580	Mgt of Prod and Proc Design	3
AENG 589	Auto Assembly Systems	3
AENG 588	Design&Manufac for Environment	3
ME 581	Materials for Manufacturing	3
ME 588	Production of Mech Products	3
ME 595	Digital Manufacturing	3

## Electives

The remaining 6 credit hours may be selected with the approval of the graduate advisor.

## M.S. Thesis Option

With the approval of their graduate advisor, students may substitute a master's thesis (i.e., IMSE 699) for no more than seven credit hours of graduate course work. IMSE 699, Master's thesis will replace three credits of program electives, Capstone Project I and Capstone Project II requirements in the program.

### 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. (FW)

#### 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 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 Rackham or Graduate

**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)

**Restriction(s):**

Can enroll if Level is Rackham or Graduate

**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