

CS3483: MULTIMODAL INTERFACE DESIGN

Effective Term

Semester A 2022/23

Part I Course Overview

Course Title

Multimodal Interface Design

Subject Code

CS - Computer Science

Course Number

3483

Academic Unit

Computer Science (CS)

College/School

College of Engineering (EG)

Course Duration

One Semester

Credit Units

3

Level

B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

CS2310 Computer Programming or
CS2311 Computer Programming or
CS2313 Computer Programming or
CS2360 Java Programming or equivalent

Precursors

Nil

Equivalent Courses

Nil

Exclusive Courses

Nil

Part II Course Details

Abstract

This course aims to develop an understanding and practical skills of how to design usable interfaces to computer-based environments that interact with, and support human multi-modal information processing.

Course Intended Learning Outcomes (CILOs)

CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Discover human characteristics important in carrying out tasks using computer-based environments and be able to apply these characteristics to the design of a user-oriented multi-modal interface.	x	x	
2	Perform a detailed analysis of the target user community of an interface.		x	
3	Create new forms of user-oriented interfaces by applying suitable design principles.			
4	Adopt alternative modalities, in addition to keyboard and mouse input, in user-oriented interface design.		x	
5	Perform critical assessment of a multimodal interface design.	x	x	

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Teaching and Learning Activities (TLAs)

TLAs	Brief Description	CILO No.	Hours/week (if applicable)	
1	Lecture	The lecture will focus on the introduction of the theories, principles and guidelines of multimodal interface design.	1, 2, 3, 4, 5	3 hours/week

2	Tutorial	Students will work on a different case study in each tutorial session. In particular, they will have group discussions to perform critical assessment of the case study, and each group is required to complete a take-home exercise, in the form of a brief report of their discussion results in each tutorial session.	5	8 hours/semester
3	Group project	Students will work as a group to create a new design for a user-oriented interface. The interface should allow interaction through a creative combination of different interaction modalities. The students will apply the theories, principles and guidelines they have learnt in the lectures and tutorials for their design.	1, 2, 3, 4	After class
4	Assignment	Students will implement an interface design which makes use of alternative modalities of interaction, in addition to keyboard and mouse input. The implementation results are to be summarized in the form of a report	4	After class

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Group project	1, 2, 3, 4	30	
2	Assignment	4	20	
3	Tutorial performance	5	10	

Continuous Assessment (%)

60

Examination (%)

40

Examination Duration (Hours)

2

Additional Information for ATs

For a student to pass the course, at least 50% of the maximum mark for the continuous assessment and 30% of the maximum mark for the examination must be obtained.

Assessment Rubrics (AR)

Assessment Task

Group project

Criterion

1.1 Capability to apply the theories, principles and guidelines they have learnt to design a multimodal interface.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

Group project

Criterion

1.2 Capacity for creatively integrating multiple modalities of interaction to enhance user experience.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

Assignment

Criterion

2.1 Ability to implement an interface design which makes use of alternative modalities of interaction, in addition to keyboard and mouse input.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

Assignment

Criterion

2.2 Capability to compare the usability of multimodal interface and conventional user interface, and summarize their findings in a report.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

Tutorial performance

Criterion

3.1 Capacity for analysing case studies in multimodal interaction design, and effectively summarizing the findings in the take-home exercises.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

Examination

Criterion

4.1 Ability to perform a detailed analysis of the target user community of an interface.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

Examination

Criterion

4.2 Capability to perform critical assessment of a multimodal interface design.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

Examination

Criterion

4.3 Capacity for designing a multimodal interface based on a requirement specification.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

Human psychological and physical ergonomics. Tools. Human sensory: visual, aural and kinesthetic limitations. Human psychological expectations and limitations. Forms of interaction. Information interaction design. Human performance engineering. Usability testing. Ethics of testing. Measures. statistical and psychological tool kits. The design process.

Design metaphors. Sketching. Object/action paradigm. Conceptual modeling. Use scenarios. Dialogue formalisms. Guidelines. Industry standards. nonverbal communication. Use of colour, sound and gestures. Documentation. Help systems. Tutorials. Integration with program design. Windowing systems. Multimedia environments. Elements of graphics.

Syllabus

- Background to human use of computer systems
How people use computers. Concept of the computer as a tool. Concept of the end-user need. Ergonomics and human performance engineering. Information processing modalities: visual, aural and kinesthetic factors. Conceptual (mis)match. Forms of interaction. Role of metaphors in designs. Information seeking in electronic environments.
- Evaluation of human-computer interaction
What makes products easy for people to use; frameworks for testing human-computer interaction; ways of testing: when to test and how to test; ethics of testing that involves human subjects; measurement in testing: time, response, accuracy, learning, recall, errors; what makes an interface human-centred.
- Design
Design process. Development of visual prototypes through sketching, drawing and interactive prototyping. Conceptual models. Object-action paradigm for design. Methodologies of design. Design metaphors. Information structuring design. Physical design: colour, visual displays, keyboards, pointing devices. Sound and voice. Screen layout. Paper forms design. Use scenarios, interaction scripts, dialogue and its specifications.
- Environment and development platforms
Hardware input/output objects. Integration of manuals, quick reference guides, courses, on-line help, tutorials and information guides as part of the user interface. User interface management systems (UIM). Managing the design

process. Multiple communication media and existing software components for developing user-interface designs: fundamentals of windowing systems, web-based systems, cyberworlds, elements of graphics, virtual environments.

Reading List

Compulsory Readings

Title	
1	Shneiderman B. and Plaisant C. (2009) Designing the User Interface: Strategies for Effective Human-Computer Interaction. Addison Wesley, 5th edition.

Additional Readings

Title	
1	Norman D. (2013) The Design of Everyday Things. Basic Books
2	Raskin J. (2000) The Humane Interface. Addison Wesley.
3	Norman D. (1999) The Invisible Computer. Cambridge, MA: MIT Press.