

Human-Machine Interaction

Prerequisites:	Basic programming skills
Learning outcomes:	<p>As a result of discipline studying students should know:</p> <ul style="list-style-type: none"> • main functions, types and characteristics of the HMI • MVC model • criteria of software interface evaluation <p>be able:</p> <ul style="list-style-type: none"> • human ergonomics to develop GUI using the HMI approach • to use the user centered design in software project • to evaluate user interface of software <p>have an idea:</p> <ul style="list-style-type: none"> • of human ergonomics • about GUI building tools

№	Lecture	Hours	Laboratory works		Lit
			Contents	Hours	
1.	Introduction to HMI				
	History of interaction, Interaction evolution, Groupware, Mobile and pervasive computing	2 h			
2.	Human factors : introduction to HMI conception problematic				
	Contribution from the cognitive psychology and ergonomics: human processor model, Rasmussen model, ICS model, Action theory, quality factors (utility, usability, learnability, observability), task model, cognitive effort, semantic and articulatory distance, cognitive effort and direct implication feeling	2 h			[1] [2]
3.	Interfaces Ergonomy				
	Material for interacting: concrete interactive object, interaction mechanisms, abstract interactive object, dialog or interaction styles, physical environment ; Physical ergonomics, cognitive ergonomics, software ergonomics; Shneiderman quality criteria ; Design criteria ; Ergonomic recommendations	4 h	Exercises: analysis of interfaces parts to verify ergonomic criteria and quality criteria. Criteria verification on existing interactive softwares and web sites	4 h	[1]
4.	Design Method				
	Needs Analysis: Task and Activity analysis, user Modeling, task model formalism, formal specification	2 h	Design exercises about different user interface parts (menu, input form design, screen organisation, etc.)	2 h	[1] [2] [3]

5.	Software architecture				
	Basic principles, development process, Seeheim model, Arch Model, Multi-agents models: MVC and PAC architectures	2 h	Application of the whole development cycle on a small project: design	2 h	[4]
6.	Tools for interactive systems building				
	Widgets, APIs, ToolBoxes, scripts languages, Interfaces generators, web development	2 h	Application of the whole development cycle on a small project: development	4 h	[4]
7.	Evaluation				
	Evaluation with users, evaluation without users (G.O.M.S., Heuristic evaluation, evaluation by ergonomic recommendations), Cognitive Walkthrough method	2 h	Application of the evaluations methods on the projects developed and on existing softwares and web sites	4 h	[1] [2]
	TOTAL:	16 h		16 h	

Literature:

- [1] Dix, A., Finlay, J., Abowd G., Beale R. (2004), **Human-Computer Interaction**, 3rd Edition, Pearson Education Ltd, Prentice Hall, Harlow, GB, ISBN 0130461091
- [2] Shneiderman B., Plaisant C., **Designing the User Interface: Strategies for Effective Human-Computer Interaction** (4th Edition), Addison-Wesley, March 2004, ISBN-13: 978-0321197863
- [3] Helen Sharp, Yvonne Rogers, Jenny Preece, **Interaction Design: Beyond Human-Computer Interaction 2nd edition**, Wiley, March 2007, ISBN-13: 978-0470018668
- [4] Dan R. Olsen, **Developing User Interfaces (Interactive Technologies)**,

Web links:

UAN <http://www.it.bton.ac.uk/staff/rng/teaching/notes/UAN.html>
 ICS <http://www.shef.ac.uk/~pc1jm/guide.html>

Recommended Textbooks (MIT course) :

[Norman, D. A. The Design of Everyday Things. New York, NY: Doubleday, 1990. ISBN: 0385267746.](#)

This little book is a classic work on usability, not just of computer interfaces but also of physical objects like doors, showers, and stoves. Full of great anecdotes, plus theory about how users form models in their heads and how users make errors. Belongs on every engineer's shelf.

[Nielsen, J. Usability Engineering. Burlington, MA: Academic Press, 1994. ISBN: 0125184069.](#)

Somewhat dated but still useful handbook for discount usability engineering, covering many of the evaluation techniques we'll be learning in this class.

[Mullet, K., and D. Sano. Designing Visual Interfaces: Communication oriented techniques. Upper Saddle River, NJ: Prentice Hall, 1994. ISBN: 0133033899.](#)

A terrific guide to graphic design, chock full of examples, essential principles, and practical guidelines. Many programmers have a fear of graphic design. This book won't teach you everything -- it still pays to hire a designer! -- but it helps get over that fear and do a competent job of it yourself.

These Textbooks are Good References

[Baecker, R. M., et al. Readings in Human-Computer Interaction: Toward the Year 2000. San Francisco, CA: Morgan Kaufmann, 1995. ISBN: 1558602461.](#)

[Shneiderman, B. Designing the User Interface: Strategies for Effective Human-Computer Interaction. 4th ed. Reading, MA: Addison-Wesley, 2004. ISBN: 0321197860.](#)

[Dix, A., et al. Human-Computer Interaction. 2nd ed. Upper Saddle River, NJ: Prentice-Hall, 1998. ISBN: 0132398648.](#)

[Olsen, D. R. Developing User Interfaces. San Francisco, CA: Morgan Kaufmann, 1998. ISBN: 1558604189.](#)

Other Books We Like

[Tufte, E. R. The Visual Display of Quantitative Information. Cheshire, CT: Graphics Press, 1983. ISBN: 0318029928.](#)

[Raskin, J. The Humane Interface: New Directions for Designing Interactive Systems. New York, NY: ACM Press, 2000. ISBN: 0201379376.](#)

[Johnson, J. GUI Bloopers: Don'ts and Do's for Software Developers and Web Designers. San Francisco, CA: Morgan Kaufman, 2000. ISBN: 1558605827.](#)

[Card, S. K., T. Moran, and A. Newell. The Psychology of Human-Computer Interaction. Hillsdale, NJ: Lawrence Erlbaum, 1983. ISBN: 0898598591.](#)

Books about Statistics and Experiment Design

[Gonick, L. Cartoon Guide to Statistics. New York, NY: Harper, 1994. ISBN: 0062731025.](#)

[Box, G. E. P., W. G. Hunter, and S. J. Hunter. Statistics for Experimenters: An Introduction to Design, Data Analysis, and Model Building. New York, NY: Wiley, 1978. ISBN: 0471093157.](#)

[Miller, R. G. Beyond Anova: Basics of Applied Statistics. New York, NY: Wiley, 1986. ISBN: 0471819220.](#)