

SMART & INTERACTIVE FURNITURE / PRODUCT / INTERIOR DESIGN

elective graduate SEMINAR with Visiting Resident Professor Jim Postell

FALL 2017

Class Time: Tuesday afternoons 14:15 to 18:15
Instructor: Resident Professor Jim Postell, email jim.postell@uc.edu
Class Room: to be determined, Scuola del design, Bovisa Campus
Course Credits: 6 Credit Hours
Office Hours: Room (to be determined) - by appointment



A new era is beginning that builds and extends the impact of digitization in unanticipated ways Image: REUTERS/Reinhard Krause

This graduate elective seminar will be conducted in English and is open to all graduate students in the School of Design, Politecnico di Milano, Bovisa campus. The seminar combines lectures with assigned readings, class discussions, and a three-phased comprehensive assignment on the subject of smart, interactive, and innovative design, focusing on furniture design, product design, and interior design. The seminar offers a broad and deep introduction into the subject area of **Smart and Interactive Design** tethered to digital design and fabrication tools . . . fueling today's 4th Industrial Revolution.

This course incorporates a broad range of smart and interactive design concepts and investigates the use of smart materials and innovative fabrication technologies in current furniture, product, and interior design. Course material will be delivered through lectures and required readings (supplied as pdfs). Content will parallel and support the phased project assignments, periodic reviews, and culminate in a final, collective presentation of smart and interactive furniture/ product/ interior projects presented to faculty and design professionals at the end of the semester.

COURSE DESCRIPTION

Lectures, class discussions, and a three-phased assignment all work together. The goal of the course is to help students develop their understanding of smart, innovative, and interactive design, while at the same time, broaden their knowledge in areas of furniture, product, and interior design.

The overall goal of this course is to consider the question: *What constitutes smart, interactive, and innovative design?* A significant portion of the course delivers a comprehensive body of knowledge on how things are made, how things are used, how design performs - focusing on materials, furniture, product and interior design. In the course, we will begin by looking briefly at three previous industrial revolutions and concentrate on the current, 4th Industrial Revolution.

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Students attending this course will learn about:

- international furniture, product, and interior designers
- furniture and product typologies and design taxonomies
- anthropometries and ergonomic theories related to seating, posture, use, and the human body
- perspective into companies that produce smart and interactive furniture, product, and interiors
- background information on selected regional & cultural geographies from which innovative design ideas and technologies emanate
- global professional practices, markets, and promotional strategies
- smart materials and innovative fabrication technologies
- how the disciplines of architecture, interior design, industrial design, and fine art, contribute to design and fabricate innovative furniture design
- national / international venues for furniture & product design, including journals, tradeshow & exhibits.

A portion of this course focuses on interior millwork as applied to an interior environment, particularly related to the design, specification, and joinery of materials used in casework. The content of this portion of the course includes:

- innovative custom cabinetry
- environmentally sensitive detailing and joinery
- interactive built-in / casework
- smart material specification
- trends in hardware and finishes
- rapid prototyping, CNC milling, robotics, smart-wraps, and other digital innovation / technologies

Students will be introduced to innovative digital and hand fabrication processes, product design, innovative engineering processes, and shown how smart materials are used to complement design intentions in some of today's remarkable furniture, product, and interior millwork projects. Furniture, product, and interior projects will be the venue for lectures, class discussions, and will complement the comprehensive, design-based, three-part assignment, (with in-progress and final project reviews incorporated).

EXPECTATIONS

Students are responsible for all the readings, class discussions, attendance, and one three-part project for evaluation in this course. The primary project will involve documentation and analysis of smart and interactive designs and then result in each student designing a working-prototype of a furniture / product / interior millwork project that explores and applies smart and interactive design ideas. The comprehensive project involves developing drawings and text to document, analyze, and synthesize a furniture / product or interior millwork project of choice.

Students will work through the semester on the comprehensive and phased project in a linear manner. The assignments parallel the course readings, class discussions, and prepared lectures. The drawings and text efforts will generate a deeper and clearer understanding of the following: *interactive design ideas, the use of smart materials, and innovative fabrication techniques.*

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Overview of the 3-part Comprehensive Assignment

Regarding the choice of what type of furniture, product, or interior millwork component to document, analyze, and synthesize through the three assignments, students may choose a precedent based upon human use & interaction, smart materials and design ideas, and innovative design ideas. The challenge is for students to consider a broad range of human use and performance characteristics while at the same time, focusing on smart, interactive, and innovative aspects. One might consider the following general use-based taxonomies, as a place to start:

Human Body Support:	(chair, bench, bed, stool, seating system, handrail, guardrail, stair, etc.)
Storage / Display / Container:	(wall unit, shelving / storage / display exhibit system, buffet, etc.)
Table / Desk / Work Surface:	(coffee table, side table, dining table, work-table, desk, accessory, etc.)

Within the general use-categories for study, students should consider the following content areas:

- 1) innovative design / digital fabrication technologies
- 2) interactivity
- 3) smart materials
- 4) sustainable / environmental considerations

OUTLINE AND FORMAT FOR THE COMPREHENSIVE 3-PART ASSIGNMENT

After initial exposure to a broad range of innovative projects, each student will select a primary project to document, analyze, and “re-design”. Once the project priority has been determined, students will begin working on the comprehensive project - first by documenting the product (assignment #1) – then by analyzing it (assignment #2), and then, by re-designing it into something new (furniture, product, or interior millwork (assignment #3).

For the first assignment, students are encouraged to have hands-on access to their chosen product, in order to learn directly about the formal characteristics and materials used in the piece. The point is to keep the documentation process and material / dimensional parameters relatively clear and well understood as one develops the first of three assignments for the course.

Collectively, the first phase (documentation phase) will introduce students to core-content areas of smart and interactive furniture / product / and millwork design and enable collective review of the selected projects. Students will learn how to specify and delineate materials and details related to their precedent-study project. In the process of documenting a product of choice, students will gain a substantial level of knowledge about the product. In the second phase of the comprehensive project (the analysis phase), students will learn how well the product performs, about human use, ergonomics, and the technologies used to fabricate the piece.

Documentation of the product should be done carefully, in order to document accurate size and form parameters. Through the series of assignments (and reviews) that will follow in the weeks ahead, students will develop their understanding of design, fabrication, use, material, and workmanship.

Following the initial efforts to document and analyze a product of choice, students will consider how to “improve” a particular aspect of the selected piece. Students will consider how the product might be transformed somehow. Primary use, dimensions, material decisions, etc., can all be transformed in the third phase of the comprehensive project, encouraging each student to consider altering any dimension of the project in order to make the selected product more “Smart”, more “Innovative”, more “Interactive”.

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Students will develop and complete finely delineated scaled drawings, indicating material / color and visible surfaces (and optional full-size or scaled model studies) for presentation. Each student must complete a set of drawings in order to illustrate their documentation, analysis, and redesigned efforts. Each student must illustrate their product being used and in a spatial context. By rendering the revised product in use and in spatial context, students shall create a social and environmental context for the work (use, time, and place) best suited for the revised piece - presenting smart and interactive design values in an "ideal setting" and in use.

Assignment #1:

You are to begin by documenting a smart and interactive product of your choice, considering smart and interactive design ideas as the focus of your selection. After two weeks of lectures and discussions, students will carefully begin to document a product (via drawing) and develop brief text description, working independently. Making a set of drawings will help students consider form, scale, size, surface, order, and material . . . the "visible" characteristics of product design. This exercise will help students understand the formal and measurable aspects of their selected product.

Initial documentation efforts need to be of the highest quality, from which, the results will be useful in analyzing the product in Phase 2. Allow this first assignment to "set course" for a primary direction of inquiry for your interest in furniture / product / interior design.

Scale and format of the drawings will be determined in seminar. All sheets shall be A3.

Assignment #2:

The second assignment involves analysis. Analysis can make visible some of the invisible conditions of the product through drawing, diagramming, and text useful to evaluate use, wear, performance, effectiveness and taking into consideration; fabrication, durability, human use, maintenance, context, marketability, etc.

If you want to drop your initial line-of-inquiry and choose another product (different from your initial product selection), you may **do so now** – and if you choose this option, you are asked in Assignment #2 to make documentation first of your new inquiry, and then immediately jump into the analysis. Assignment #2 builds upon the set of drawings produced in Assignment #1, so the product assembly, materials, finishes, and measurements need to be delineated clearly. In this phase, students will study human use and consider many aspects that are not visible characteristics of the product.

Assignment #3:

This assignment is designed to guide redesign efforts (synthesis) in transforming the documented and analyzed product by retooling it into a more Smart, more Innovative, more Interactive product. In this phase, you will explore, resolve, and present the transformed product side-by-side to the original documented product - and in the process, discover subtle or obvious characteristics of Smart and Interactive design. This gives students an opportunity to see their chosen product transformed in a graphic and comparative manner at the final review.

FORMAT FOR ASSIGNMENT #3

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5 sheets minimum with each sheet plotted at A3 size (**oriented vertically**).

2.5cm margins – top, sides, bottom. Text to be double-spaced. Font type is your preference. Font & size of the main body of the text shall be 12-14 point – larger may be necessary to read well from a distance.

Sheet 1 will be your title page, centered approx. 5cm from the top of the page, include the following: Title of the furniture design / product / millwork design. Centered approx. 2cm from the bottom of the page, include your name, program, school affiliation, and date.

Between this information (centered on the page), include a high quality image of the furniture / product / interior design. The image can be a drawing, a sketch, or photograph (remember the vertical format remains for all sheets).

Sheet 2 include at the upper left margin the following information:

Title of furniture / product / interior project

Name of designer (dates, address if known)

Date of production / fabrication

In the upper right header of the text page, include a small reference image of the furniture design - this may be a sketch or photograph (not to exceed 5cm x 5cm).

Using either twelve or fourteen-point font, use the remainder of the entire page to write your text in **three concise and well-written paragraphs**.

The first paragraph shall describe the general background description, setting the context, and functional information of the design. It shall highlight the intended purposes, intended user group and general background information of interest, ranging from societal to cultural considerations.

The second paragraph shall document everything measurable and technical about the product in a concise manner. You should include its weight, material(s), finish, production process of its making, dimensional information, cost, and formal description. Students should be precise in terms of material explanation and fabrication process.

The third paragraph is the opportunity to reflect upon the design by offering constructive criticism. You are encouraged to write a brief, but salient design critique based upon your perception of some pros and cons of the design. Focus on the values of Smart, Interactive, and Innovative aspects.

On the remaining A3 sheets, do not include title or product icons. Include only the drafted drawings, text and dimensions as required.

Sheet 3 shall include measured drawings in plan, elevation, and section. Original drawings ought to be drawn using a CAD program and printed at a metric scale close to 1:4 scale. You may use A3 format or use any number of A3 sheets (but keep all sheets A3 and vertically oriented).

Attention to line quality is very important in these drawings. Drawings may overlap one another. This traditional technique works well. Color or material quality should be incorporated in the photocopy prints.

Sheet 4, one exploded axonometric - showing all SIGNIFICANT components of the furniture / product / interior. The angle and view of the drawing is up to you. The exploded axonometric should be carefully rendered and accurate in dimension and appropriately sized to fit the format. This shall be a computer generated plot using Sketch-up, AutoCad, Rhino, or REVIT, etc. software programs. Remember, if drawn

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by hand, the original drawing should be done in metric 1:4 scale. Exploded axonometric drawings do not need to indicate a scale on these drawings.

Sheet 5 – One rendered image showing the furniture / product / interior component in use and in context.

This sheet is most important and becomes the fifth and final sheet for both assignment #1 and assignment #3. You are to produce a single high-quality image showing the product in use and in context. The idea is to create a single image that communicates the spatial context, use, purpose, and design qualities of the piece in one image.

Orientation of the sheets shall be formatted vertically, A3 in order to integrate seamlessly within assignments #1-3. Students are expected to create and render a high quality perspective drawing showing the product in use and in an appropriate spatial context. Feel free to use software such as Photoshop to assist in this work. Digital or collage efforts may help communicate clearly and effectively.

Final Presentation:

The guidelines for the final presentations shall be followed by every student. When the drawings are collectively pinned-up, the class will appreciate the comparative studies – including the designs developed by students and the products designed by others – all presented in the same format and at the same scale. Precision, thoroughness, and attention to detail will impact the quality and evaluation of the collective work. Final submission of all work for Assignment #1 and Assignment #3 shall be on a minimum of (5) A3 colored photocopies (each assignment) – all oriented vertically. Assignment 2 may be a few as 3 sheets or as many as 5 sheets. Please submit a hard copy of the final work PLUS digital files for each sheet saved as hi-res TIFF files when this exercise has been submitted at the end of the semester for the final grade.

Criteria for Grading: for each of the Assignments #1-#2, #3:

Overall completeness and format of drawings:	50%
Smartness, Interactivity, Innovation incorporated about the product or transformed piece:	25%
Completeness of text and specifications:	25%

RESOURCES / REFERENCE/ REQUIRED READING:

The 4th Industrial Revolution – Klaus Schwab, Crown Business, 2016
Furniture Design 2nd edition – Jim Postell, John Wiley and Sons, 2012
Smart Materials – Axel Ritter, Birkhauser, 2017

The following books are listed for reference only; to read or review on your own.

Digital Fabrications, Iwamoto, Lisa, Architectural and Material Techniques, New York: Princeton Architectural Press, 2009.

Architectural Woodwork Institute, Architectural Woodwork Quality Standards Illustrated, 8th edition, (Potomac Falls, VA: Architectural Woodwork Institute.)

Modern Furniture Classics Since 1945, Charlotte and Peter Fiell, AIA Press.

Furniture - Architects and Designer's Originals, Carol Soucek King, PBC International, Inc.

The Chair, Galen Cranz, by W. W. Norton & Company

Furniture - A Concise History, Edward Lucie-Smith

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History of Furniture, Mark Hinchman, Fairchild
Judith Miller, Furniture: World Styles from Classicism to Contemporary
(London: Dorling Kindersley Publishing, 2005)

History of Millwork:

John Pile, A History of Interior Design (New York: John Wiley & Sons, 2005)

Stephen Calloway, ed., The Elements of Style; An Encyclopedia of Domestic
Architectural Detail, (New Edition), (Buffalo, NY: Firefly Books, 2005)

Woodworking and Millwork

Albert Jackson, David Day, Simon Jennings, The Complete Manual of Woodworking, (New
York: Albert Knopf, 2006)

The Complete Illustrated Guide to Furniture and Cabinet Construction, (Newtown, CT:
Taunton Press, 2001)

Matthew B. Crawford, Shop Class as Soulcraft, Penguin Press, 2009

Casegoods, Millwork Detailing and Specifications

Mary Rose McGowan, Specifying Interiors: A Guide to Construction and FF&E for
Commercial Interior Products, (New Jersey: John Wiley & Sons, 2006)

Lisa Godsey, Interior Design Materials and Specifications, (NY: Fairchild Books, 2008)

George M. Beylerian and Andrew Dent, Ultra Materials: How Materials Innovation is
Changing the World, (London: Thames and Hudson, 2007)

George M. Beylerian and Andrew Dent, Material Connexion: The Global Resource of New and Innovative
Materials for Architects, Artists and Designers, (New York: John Wiley and Sons, 2005)

Online Resources: Functional and Decorative Hardware, Tools, Nuts, & Bolts

www.hafele.com

www.baerco.com

www.outwater.com

www.vandykes.com

www.rockler.com

www.woodworker.com

www.mcmaster.com (mcmaster-carr)

www.grainger.com

Materials

www.materia.nl

www.paletteapp.com

www.materialconnexion.com

www.mbvener.com

www.vener.com

www.inlays.com

www.paxtonwood.com

www.chairmasters.com

www.brazilian-granites.com

www.aag-glass.com

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Course Schedule:

WEEK	DATE	ACTIVITY	OUTPUT
1	Tues. Sept 19		
	14:15-16:00	Introduction and Organization What is Smart, Interactive, and Innovative Design? Review calendar, the three assignments, Introduce the readings, and syllabus. Q & A discussion about the three assignments	During the week: Secure the digital readings, review on-line course protocol. Read by next class - Chapter 1 In Furniture Design. Begin to consider options for documentation study for Assignment #1. Read by next class - pdf from The 4 th Industrial Revolution.
	16:15-18:15	Presentation on Smart, Interactive, and Innovative Design	
2	Tues. Sept 26	Lecture: (The 4 th Industrial Revolution)	
	14:15-16:00	Introduction of a chronology of 4 industrial revolutions - beginning with the first (during the mid 1800s).	For next class, bring questions and options for your choice of assignment #1.
	16:15-17:00	Presentation of Smart Materials, Furniture, and Product Designs that have been directly influenced by technology.	Discussion and collective review by classmates.
	17:00-18:15	Lecture: Typologies and Taxonomies . . . Lexicons, Venn Diagrams & more Typologies and Taxonomies can be ordered in a number of ways but there are clear distinctions between these two terms – including: quantitative and qualitative description – utility, form, social use, unique properties, and relationships to the human body.	One intention of assignment #1 is to highlight a diverse range of “smart” and “interactive” design issues as means to stimulate class discussion related to evolving technologies. Assign: Read Chapter 6 Materials – in Furniture Design For next class.
3	Tues. Oct 3	Q & A on Assignment #1	Product selection to document for Assignment #1 due at the beginning of class.
	14:15-15:00	Presentation: Student work from Cincinnati	
	15:00-16:00	FURNITURE / PRODUCT / INTERIOR MILLWORK CASE STUDIES: PRECEDENT	

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	16:15-18:15	Review/ class selection of assignment #1 (process review – drawings and photos)	
4	Tues. Oct 10 14:15-16:00	Presentation: Performative Analysis Furniture / Product / Interior Design:	Prep for Assignment #2 Draft efforts for collective review
	16:15-18:15	An overview of things to consider	Assign: Read Chapter 7 of Furniture Design Fabrication
5	Tues. Oct 17 14:15-16:00	Smart and Interactive Furniture, Product, and Interior Design Case Studies	Assignment #2 draft due
	16:15-18:15	Pin-up review: Second draft Assignment #1 with first draft of Assignment #2	Assign: Read Chapters 5 & 6 Furniture Design
6	Tues. Oct 24 14:15-16:00	Presentation: Theory (Human use)	
	16:15-18:15	Pin up / display of full size elevation and plan drawings – showing human use & product design on large, self-made sheets of any kind of media/paper	
		Assignment #2 completed out of class	
7	Tues. Oct 31 14:15-16:00	Presentation: Design	Assign: Assignment #3 Drawings on size A3 sheets
	16:15-18:15	Pin-up review (draft)-review of Assignment 3 - all drawings to be on A3 sheets) followed by, time to rework / modify the design ideas focus on: details, surface studies, joinery, etc.	Read selected chapter in The 4 th Industrial Revolution
8	Tues. Nov 7 14:15-16:00	Presentation: Smart Materials	Consider the re-design of your project by the next class Students set the scope of work

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	DATE	ACTIVITY	OUTPUT
	16:15-18:15	Prep discussion and Pin-up draft-effort review of Assignment #3	for assignment #3 this week Assign: Read Chapter 4 Smart Materials
9	Tues. Nov 14 14:15-16:00 16:15-18:15	Digital Fabrication and Professional Practice Assignment #3 draft of drawing sheets due for review (along with current ver Assignment #1 and #2 Q & A	Primary Project drawing set draft due: Pin up of assignments 1-3 due: Note: assignment #3 drafts should include assignments 1-2 Assign: Read Chapter 10: Historic Overview in Furniture Design
10	Tues Nov 21	Field Trip (tbd) B & B, Kartell, Molteni	
11	Tues. Nov 28 14:15-16:00 16:15-18:15	Presentation: Historic Overview of Smart, Interactive, Furniture, Product, and Interior Design Presentation showing previous UC projects – issues and aspects to consider and resolve through the assignment	Use out-of-class time to review and modify all of your drawings
12	Tues. Dec 5 14:15-16:00 16:15-18:15	Presentation and discussion of Pre-final drawings: Following today's draft-presentation, take the time to revise any drawings in advance of the final presentation on Dec 12 Fabrication/ Specification: overview review & checklist for all 3 Assignments of the comprehensive project	Students may want to meet in small groups to present and discuss their written efforts on the project. Due: Review drafts of nearly completed sheets for all 3 Assignments -projects for pre- final review
13	Tues. Dec 12 14:15-18:15	PRE REVIEW PIN-UP with focus on details, analysis, and comparisons between assignment 1 and assignment 3	Review of completed sheets for all 3 Assignments –
14	Tues Dec 19	Exhibit of student work:	Submission of all digital

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	14:15-18:15	Final Review- A Collective presentation of all drawings to faculty and professional designers in the Dipartimento del Design, Politecnico di Milano, Bovisa campus	files from Assignments #1, #2, and #3 due.
15	Holiday – end of seminar		

- Dec 17th – digital submission of all files from the Presentation and Review of Assignments 1-3

CLASS ATTENDANCE POLICY

- All students must be present at the beginning of each class period where indicated on the syllabus.
- If you do need to miss the seminar class for a medical or family emergency, notify your professor as early as possible.
- If there is more than one unexcused absence, this will impact your grade.

GRADING

Grades are not simply given by the faculty; they are earned by the student. You will have a number of grading opportunities through the semester to demonstrate your abilities through multiple grading opportunities. You must show consistent progress and productivity. Final grades will reflect the level of effort, progress and development of each student. Final grades are determined by the quality of the completed assignments, attendance, and class participation.

Primary Project portion of the course:

*	assignment #1	30%	initial working prototype
•	assignment #2	30%	revised prototype
*	assignment #3	30%	full-scale / use study drawings
*	participation and attendance	10%	

Summation of evaluation for the course: 100%

The grading scale for graduate students will follow standards adopted by the Dipartimento di Design, Politecnico di Milano. Politecnico grading standards will be used for all assigned grades and to determine final grades. The following rubric is a reference, outlining letter grades used at the University of Cincinnati:

A - outstanding academic performance based on a comparison with others in the course and with previous students in similar courses. "A" students must exhibit a commitment to excellence, proficiency, creativity and initiative. They must also demonstrate leadership, enthusiasm and an attitude of open-minded cooperation.

B - above average level of performance based on a comparison with others in the course and with previous students in similar courses. "B" students must produce high quality work in a timely manner and be active participants in discussions.

C - average or satisfactory level of performance based on a comparison with others in the course and with previous students in similar courses. "C" students must complete all work in an acceptable and timely manner. They must also contribute to discussions.

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D - below average but minimally acceptable level of performance based on a comparison with others in the course and with previous students in similar courses. "D" students will have demonstrated a below average level of work, commitment, and proficiency. They have shown sufficient effort to keep from failing the course.

F - failure to meet minimal acceptable standards in the course compared with others in the course.

All students in this course are expected to have an active Polimi e-mail account through which class related notices, assignments, and various other communications may be obtained during the semester.

STUDENT WORK

All assignments submitted for evaluation become the property of the Politecnico for display or reference purposes and may not be returned to the student. Projects kept for records will be available for review. Students are responsible for photographing or recording their documents prior to submitting them for evaluation.

SPECIAL NEEDS POLICY

If you have any special needs related to your participation in this course, including identified visual impairment, hearing impairment, physical impairment, communication disorder, and/or specific learning disability that may influence your performance in this course, please meet with the instructor to arrange for reasonable provisions to ensure an equitable opportunity to meet all the requirements of this course.