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Spring 2020

AD 490-002: Special Topic - The History of Industrial Design (Revised for Remote Learning)

David Greenbaum

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History of Industrial Design

Through the Lens of Vitruvius and our Own

"Firmitas, Utilitas et Venustas"

(Strength, Utility, and Beauty)

AD 490 | College of Architecture and Design
New Jersey Institute of Technology

Class: Spring 2020 - Tuesdays 1-4 pm,
Location: Weston Hall : Room 260
Instructor: David M. Greenbaum, BA, MBA Adjunct Professor
Office Hours: By appointment only
Contact: DMG5@NJIT.org – 646.441.7900

This is a revised syllabus to account for the global COVID-19 pandemic and the "stay at home" order in the State of New Jersey. This course will continue as a traditionally taught Lecture and Student Presentation based Seminar (including individual and group presentations) but be delivered through an electronically mediated format with NJIT's provided WebEx platform, meeting synchronously at the regularly scheduled times. *The course will maintain the class schedule and meet synchronously online via WebEx.* Students will need to use their computers at home to attend lectures and be prepared to share screen to make assigned group and individual presentations.

Deadlines as originally scheduled, including the date of the Final Review and final submission of files, will remain unchanged unless individual circumstances, decided on a case by case basis, dictate accommodation. *

AD490 Overview:

Through the individual, group and class exploration and analysis of select iconic archetypes and innovators of design through history, we will seek to identify and integrate best practices in critical design thinking. We will explore the transition from the historical industry of artisan/mechanical craft of designer-maker through the age of mechanization methods and division of labor of production, where the acts of conception, design, planning and engineering may be wholly distinct functions, independent of direct production.

Together we will identify **Features, Attributes and Benefits** achieved in these surveyed products and processes within the historic context, in terms of resources, technologies and constraints at the time of their conception and creation. We will seek to identify whether the latest iteration is evolutionary or revolutionary in terms of relative degree of innovation and social impact.

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Learning Objectives:

• We will seek to identify core principals and ideals of fundamental design thinking as it relates to successful and enduring solutions to problems. Design success will be evaluated not only in product design innovation but also in the context of production, consumer/industry adoption, and successful commercialization of these solutions. We will consider the design's relative contexts of their antecedents and their viability in the context of successor solutions.

• We will discuss the evolution from the development of primitive hand tools to complex integrated systems.

• We will consider key moments of societal transformation made possible by examples of high social impact industrial designs.

• We will explore cultural and historic considerations including national identities and ideals as well as historic events which directly or indirectly catalyzed regional innovation in design and production.

• We will explore aesthetic considerations including review of and application of proportional theories and formal compositional strategies embraced from antiquity to the present.

• We will reflect upon John Ruskin's views on the industrial revolution and the "human cost of the mechanization of work," his philosophies espoused in his "7 Lamps of Architecture" and his prescient concerns for environmentalism, sustainability and craft.

• We will explore Design as a fundamental expression of values and ethical and moral implications of good design and the contagion of excellence.

• We will consider Futurism: the power of imagination in envisioning and anticipating far future design solutions, in many cases many decades before their practical realization, or in fact, yet to be realized. We will identify problems that we each/collectively feel need to be solved through a product or process, that has yet to be envisioned or produced.

• We will consider industrial design in a broad range of industry categories, both consumer and industrial, spanning from food to fashion.

• We will explore the concept of "Product as Service" and consider "delivery" and "experience."

• We will explore issues of commercialization to include methods of making, manufacturing concepts including value engineering, as well as marketing and logistical considerations.

• We will discuss the concepts of "Human Centric Design" where the needs and ergonomic experience of the user has primacy in informing all conception of solutions.

• We will explore ornament and its role in industrial design.

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• We will consider emotional considerations of the product experience including the absolute importance of "Delight."

• We will explore means and methods of manufacture, the adoption and evolution of new materials, new technologies, concepts of modularity, the impact of wholly conceived systems and ecosystems of products and processes. Topics will include the transition from "craft made" to "assembly line" production through integrated models including present day "mass customization" concepts.

• We will discuss psychic considerations, tangible and intangible to the recognition, acceptance and adoption of new products and new technologies.

• We will consider design in the psychic context of the product or brand as a means of self-identity and/or status signifier.

• We will discuss "cross" and "backwards/forward" compatibility and the establishment and importance of product/industry "standards."

• We will consider un-anticipated externalities associated with product design decisions including exploring design failure and lessons learned, as well as important environmental considerations.

• We will consider Industrial Design in Products, Systems and Processes as a means of creating product distinction and as a basis for a "Moat" for sustainable competitive advantage.

• Throughout, we will consider the success of the explored design solutions in the context of Vitruvius's Creed of "Firmitas, Utilitas et Venustas" (Strength, Function and Beauty) and discuss other criteria which may be useful in gauging design success in the context of a product's entire life cycle.

Readings:

There is no central, required textbook from this course, however many readings will be pulled from two major sources:

1. Gorman, Carma. The Industrial Design Reader. New York: Allworth Press, 2004. Print.
2. Brody, David, and Hazel Clark. *Design Studies Reader*. New York, NY: Berg Press, 2009. Print.

In addition to these readings, I will be posting a variety of readings as well as videos pulled from websites, auction catalogs, design magazines, museum materials, etc. and readings will be distributed or discussed in class.

Research for class projects and presentations may be assisted by Ms. Maya Gervits and her staff in the Littman Library.

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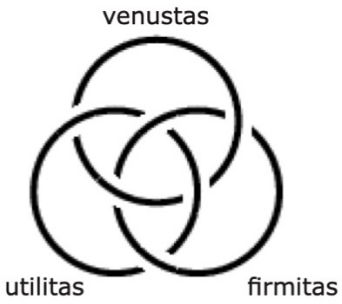

AD490 Summary:

For over 200 years, the products of mechanized industrial production have shaped our material culture, influenced world economies and affected the quality of our environment and daily lives.

From consumer goods and packaging to transportation systems and production equipment, industrial products encompass an extraordinary range of functions, techniques, attitudes, ideas and values and are a means through which we experience and perceive the world around us.

The nature of industrial products and how they come to be is determined by an ever more complex process of design that is itself subject to many different influences and factors. Not least of these are the constraints imposed by the social, economic, political, cultural, organizational and commercial contexts within which new products are developed, and the character, thinking and creative abilities of the individual designers or teams of designers, aligned specialists and manufacturers involved in their realization.

Industrial Design – the conception and planning of products for multiple reproduction – is a creative and inventive process concerned with the synthesis of such instrumental factors as engineering, technology, materials and aesthetics into machine-producible solutions that balance all user's needs and desires within technical and social constraints.

Engineering – the application of scientific principles to the design and construction of structures, machines, apparatus of manufacturing processes – is an essential and defining aspect of industrial design. While both disciplines are concerned with finding optimum solutions to specific problems, the primary distinguishing characteristic of industrial design is concern for aesthetics.

The origins of the profession of industrial design can be traced back to the industrial revolution, which began in Great Britain in the mid 18th Century, and which heralded the age of mechanization and specialized division of labor. Prior to this, objects were craft produced, whereby both the

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conception and the manufacture of an object were most often the work of a single individual or small atelier of masters and apprentices.

With the development of new manufacturing processes and the division of specialized labor, design (conception and planning) was progressively separated from the act of making. At this early stage however, design had no intellectual, theoretical or philosophical foundation and was considered just one of the many interrelated aspects of mechanical production. Thus, the industrial goods of the years up to the 19th century were created by specialists from the technical, materials and production spheres rather than by an industrial designer. Towards the end of the 19th century, however, manufacturers began to recognize that they could gain critical competitive advantage by improving the constructional integrity and aesthetic appearance of their products. Consequently, they began to invite specialists from other spheres – most notably artists and architects – to contribute to the design process.

Industrial design subsequently became a full-fledged discipline in the early 20th century, when design theory was integrated into industrial methods of production. Industrial design has since become an increasingly important factor in the success of industrial products and the companies that manufacture them.†

This AD490 course surveys a hand-picked selection of important and influential products, designers, producers and specific industry innovations with the intent to illustrate best practices in design thinking.

These innovative products, designers and producers demonstrate innovative thinking and solutions. Each striking the best possible balance between intellectual, functional, emotional, aesthetic and ethical expectations of the user/consumer and the influence and factors bearing upon the design process.

As the world's economies becomes more global, integrated and increasingly competitive, where production may take place thousands of miles away from product conception, and where commercialization may take place another thousand miles away from production, exceptional industrial design and extraordinary design organizations becomes increasingly vital as a means of gaining sustainable competitive advantage and competing on today's dispersed global scale.

By understanding the evolution of design and production of products and services, from past to present, we will gain insight and context to draw from in understanding the qualities required to create successful, innovative, commercially viable products that possesses fundamental strength, utility and beauty with consideration of social and environmental impacts.

† REFERENCE: Charlotte and Peter Fiell, ICONS: Industrial Design A-Z, Taschen Press, 2003

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AD490 Class Guidelines:

- After Spring Break, classes will be mediated digitally with WebEx. Critiques and presentations may be recorded and archived to document the work done in this class. The entire class will meet every session promptly at 1 PM. You may enter the WebEx session 5 minutes prior to the scheduled start. Group discussions, questions, announcements, and "check-in" will occur for the first 20 minutes of each class. The schedule provided serves more to determine a sequence rather than the actual time one's critique starts, or how long the critique lasts. *Because of the extra steps of sharing screens, annotating student work during a critique remotely with limited tools, the impracticality of giving control of your model to the instructor due to latency, and random connectivity problems, studio time may run as much as 30% longer than normal, face to face sessions*. Every student present will be seen every session, even when class runs long. Students may or may not remain online and "listen in" to any or all individual critiques but should remain on "mute" to not disturb the interaction currently on screen.

1 ATTENDANCE:

You are expected to attend every class unless there is an acceptable excuse (see below). You are expected to be present in class for the entire duration of the class. If you arrive late or leave early without prior approval of your instructor, you will be considered absent. An attendance sheet will be circulated at the beginning of each class. You are responsible for signing the sheet. If you miss a class, you are responsible for the material and directions covered. The NJIT attendance policy is as follows: After three absences students may be docked one-half grade for each subsequent unexcused absence. (i.e., if the final grade would have been an 'A', it results in a 'B+'. A 'B+' becomes a 'B' and so on. There is a one-half grade penalty for EACH absence after the third) and students will not be permitted to return to class without permission from both the student's instructor and class coordinator.

Acceptable Absences:
Documented Illness, Family Emergency or Unavoidable Circumstance
The only accepted documentation is notification from the Dean of Students. Your instructor will not accept notes from doctors directly. Students must present appropriate documentation to the Dean of Students within two lectures of returning.

Religious Observation:
Students must inform their instructor prior to the class that they will miss a session (or more) due to religious observance. Students are permitted to observe religious holidays of one and only one religious' holiday per semester.

2 | PRESENTATIONS, CRITIQUES + DISCUSSIONS:

Students are expected to be in class and prepared to present their work at the beginning of all scheduled presentations and critiques. Your active enthusiastic participation in critique sessions is a critical learning expectation of the class. There will be no tolerance for distractions, interruptions or any disruption to your or your classmate's presentations. Students will be asked to leave the classroom immediately if they disrupt any presentation or discussion. Presentations and Critiques are the times for active dialogue with your classmates concerning the project. Use this time constructively to engage and be engaged with your peers.

3 | ASSIGNED WORK:

Work is due as scheduled on the Syllabus or assigned by your instructor. Work will be accepted up to one week late, but it will be automatically dropped in grade. All written work submitted for this course must meet the Standards for English I. Poorly written papers will be returned to you, without a grade, for revision. Students are encouraged to utilize the resources provided by NJIT for assistance with written papers.

4 | REVIEWS:

There will be Student Prepared Presentations each week during the semester. Active participation in discussing and evaluating these Presentations is an important part of your studio experience. Each student should be prepared to present at the beginning of the class

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time and stay for the entire class. If you are not prepared to present at the beginning of the class session (or are not present) your grade for the presentation may be reduced.

5 | DIGITAL TECHNOLOGY:

Cell phones and all PDA devices are not permitted to be used in class to send or receive messages. All phones must be placed on silent and kept stowed away during class. If your phone disturbs the class, you may be asked to leave and assigned an absence for that day.

Laptop computers are to be used exclusively for note taking, computer aided drafting and modeling (CAD), and approved research. Under no circumstances are students permitted to use email, instant messaging, web surfing, or video/audio streaming during studio unless expressly authorized by the instructor for the purpose of specific classroom instruction.

6 | NO FOOD IN CLASS

The eating of food and the chewing of gum is strictly prohibited in class. During a designated break period, students may consume food or beverages however both food and beverage must be stored away once class resumes.

7 | STUDENT ACCOMMODATIONS

All reasonable efforts will be made to accommodate a student with a temporary disability (e.g., broken arm, protracted illness, etc.) as long as the student is responsible for communicating with their instructor about the issue and for cooperating in its resolution. Students with more permanent physical or learning disabilities must provide documented requests for accommodation to their instructor at the beginning of the semester (or as soon as the disability is diagnosed and documented). Students should contact the Disability Office (http://www.njit.edu/counseling/services/disabilities.php) for further information and instruction for obtaining medical and/or psychological disability documentation.

8 | ACADEMIC CONDUCT & INTEGRITY

"Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at:

http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. **Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university.** If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu"

POST COVID 19 Revisions to Syllabus:

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AD490 Class Grades

Your' grade for the semester will consist of the following assignments/performance. (See #1 - 4 in Class Guidelines above for elements that affect grading policy)

0%-50% Attendance: It is presumed you will attend each and every class. 1 Excused Absence will not affect your grade, though the subject and discussions from the missed class will assuredly be incorporated into the final exam, which will likely be detrimental. 2 Absences automatically reduce grade 0.5 points (12.5% of grade), 3 Absences automatically reduce 1.0 points (25% of grade), 4 Absences automatically reduce 2.0 points (50% of grade). Absence in the first class of the semester due to scheduling changes will not count towards a recorded absence. Unexcused tardiness to, or early departure from class will be detrimental to final grade at the instructor's sole discretion. Violations to electronics and food policy will be considered in final grade at the instructor's sole discretion.

40% Class Participation including degree of active engagement and contributions toward insights from Presentation Reviews and Class Discussions

40% Group and Individual Presentations: There will be 6 presentations to be prepared and presented assigned to each student. Two (4) of the 6 will be group presentations. Successful collaboration on group assignments/Presentations will be reflected in determining your Presentation grade. A portion of your grade for your presentations will be determined by your classmate's evaluation of your presentation based against measured ratings of select criteria. Thus, you will be accountable to your instructor, your classmates and most critically yourselves to contribute value and insight to our shared learning experience.

20% Final Exam: Any absences will likely adversely affect performance on the final exam as the exam will be require a summarization of specific key concepts and insights gained directly from your own, and your class-mate's presentations and associated discussions. Please be mindful of this.

GRADING CRITERIA

The Institute guidelines for grading are as follows. These guidelines will be used by your instructor to evaluate your work. Please familiarize yourself with these standards and discuss any questions with your instructor.

A Superior (4.0) | *Student learning and accomplishment far exceeds published objectives for the course/test/assignment and student work is distinguished consistently by its high level of competency and/or innovation*.

B+ Excellent (3.5) **B** Very Good (3.0) | *Student learning and accomplishment goes beyond what is expected in the published objectives for the course/test/assignment and student work is frequently characterized by its special depth of understanding, development and/or innovative experimentation.*

C+ Good (2.5) **C** Acceptable (2.0) | *Student learning and accomplishment meets all published objectives for the course/test/assignment and student work demonstrates the expected level of understanding and application of concepts introduced.*

D Minimum (1.0) *Student learning and accomplishment based on the published objectives for the course/project/test were met with minimum passing achievement.*

F Inadequate (0.0) | *Student learning and accomplishment based on published objectives for the course/test/assignment were not sufficiently addressed nor met.*

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Archetypes of Industrial Design | Design Criteria

- Name, Brand, Manufacturer, Years of Production
- Place of Manufacture
- History of Product including Designer if Possible
- Description of Functional Use
- Description of design including visual appearance, materials used
- Identify Problem: What function or Need does this Product Satisfy
- Describe Solution: Describe Use (break down into steps if necessary) and/or User Experience (Intuitive, Performance)
- Method of Making: Production Processes Used
- Provide Pencil Sketch or Sequential Layout of Process (attached)
- List Product Feature Set
- Principle Benefits of Feature Sets
- Other Attributes/Benefits (Portability/Storability, etc.)
- Parti: Key Design Organizing Principle
- Assessment of Construction Quality
- Aesthetic Evaluation: Clarity, Composition, Coherence, Color & Comfort
- Unique Identifiable Product Benefits:
- Discuss Direct Competing Products:
- Discuss Broad Substitutes/Alternates
- Are there Complimentary Products
- Perceived Improvements/Enhancements over Predecessor Solutions
- Improvements identified in Successor Products
- Principle Competitive Advantages
- Potential “Stickiness” Switching costs of buyer
- Independent or Integrated Products (part of a system)
- Any Add-On/Accessory Parts? Interdependencies with other products?
- Issues of Compatibility (Component, Forward, Backward)
- Risk of Obsolescence
- Commercialization: Distribution, Packaging, Advertising, Logistical, Pricing Considerations
- Social Impact
- Revolution or Evolution? Explain
- Success or Failure: Design, Commercialization
- One Sentence Advertising Headline & One Sentence Supporting Sub Headline
- Key Insights

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Archetypes of Industrial Design | Examples by Industry

- Sports & Leisure
- Transportation
- Entertainment
- Manufacturing
- Fashion
- Food
- Agriculture
- Entertainment
- Communications
- Commerce: Marketing
- Commerce: Logistics
- Furnishings
- Packaging
- Housing
- Electronics
- Energy

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Archetypes of Industrial Design | Product Icons + Innovations

- Post it Notes, Velcro
- Paper Clip, Safety Pin, Push Pin & Binder Clip
- VHS v. Betamax v. Streaming
- Nike Running Shoes
- Fender Stratocaster v. Gibson Les Paul
- Levi Jeans
- The Printing Press
- The Cotton Gin
- The Pallet, The Shipping Container
- Sony Walkman v. iPod v. Apple Music/Spotify
- Legos
- Ford Model T
- IKEA
- Piaggio Vespa
- The Pump: Roger Vivier v. Ferragamo v. Louboutin
- Chinese Food Container and Take Out Food Packaging
- Air France/British Airways Concorde
- McDonalds v. Burger King v. Wendy's
- Anglepoise/Tizio/Arco Lamps
- Tupperware
- Tesla Automobile

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Archetypes of Industrial Design | Methods of Making

- Sculpting
- Carving
- Hammering
- Plating
- Weaving
- Process Engineering
- Painting
- Printing
- Cladding
- Machining
- Sewing
- Joining
- Molding
- Casting
- Stamping
- Injection Molding
- Bending
- Forging
- Water Jetting
- Plasma Cutting
- Laser Cutting
- 3D printing
- Drilling
- Routing
- Polishing
- Decorating
- Die Casting
- Die Cutting
- Broaching
- Turning
- Fusing
- Embroidering
- Tufting
- Upholstering
- Other?

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Archetypes of Industrial Design | Company Design Cultures

- Apple
- Festool
- Tesla
- Porsche

- Braun
- Jaguar
- IKEA
- Adobe
- Kodak
- Doyle Dane Bernbach
- Patagonia
- Herman Miller/Knoll
- Sony
- Leica
- Coca Cola
- McDonalds v. Burger King
- Burton
- Starbucks
- Tesla
- Ford Model T
- Google
- John Deere
- Pininfarina
- Frog Design

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Archetypes of Industrial Design | Important Designers to be Considered

- Raymond Loewy
- William Lyons
- Hartmut Esslinger
- William Morris
- Eero Saarinen
- Norman Bel Geddes
- Saul Bass
- Andrea Palladio
- Charles and Ray Eames
- Donald Deskey
- Leonardo Vinci
- Moshe Safdie
- James Dyson
- Dieter Rams
- Eero Sarinen
- Richard A. Teague
- Giorgetto Giugiaro
- Alvar Aalto
- Walter Dorwin Teague
- Others

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Archetypes of Industrial Design | Presentation Guidelines

(I) Introduction of Assigned Topic:

(II) LOG Line: A simple Statement that succinctly distill the basic descriptive, narrative arc and key conclusion of your analysis in no more than 3 sentences. Emphasis is on essential Design Thinking and insight drawn from product or process to be presented.

Example:

'A police chief, with a phobia for open water, battles a gigantic shark with an appetite for swimmers and boat captains, in spite of a greedy town council who demands that the beach stay open .'

(III) Product/Process Context:

- Description
- History (Predecessor, Successor, Current Viability)
- Designer
- Producer/Manufacturer
- Construction (Materials, Methods of Making)

(IV) Illustrative Pencil Drawn Sketch

(V) Programmatic Study

(VI) Identify Key:

- Features
- Adaptations/improvements from previous models
- User/Customer Profile
- Attributes
- Advantages/Benefits
- Identification/Evaluation of Success Metrics
- Alternate/Substitute Products or Processes
- Ancillary/Accessory Products or Processes

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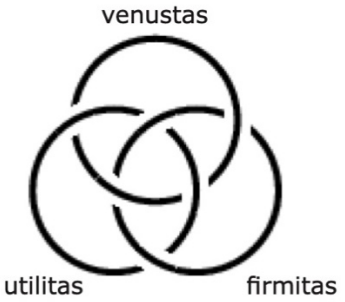
(VII) Evaluation through the lens of Vitruvius (Strength, Function, Beauty)

- Quality of design/build
- Functional Performance
- Experiential and Aesthetic Observations



(VIII) Commercialization

- Adoption and Penetration of Market Share
- Relative Commercial Success and Life Cycle

(IX) Psychic Considerations

- Branding
- Positioning
- Perceptions of Distinction
- Other

(X) Key Insights and Conclusions Drawn

(XI) Discussion and Evaluation

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