ID 340. Materials and Processes.

Restrictions: Junior level or higher.

Course description -

The student will be introduced to the basic materials and processes used in manufacturing of both short run and mass-produced objects. The course will consist of lectures, research, analysis and exercises involving both traditional and state-of-the-art manufacturing processes.

Instructor - Martin Short
Fall 2024 ID340.
Tuesdays 8.30am-9.50am. Thursdays 8.30am-9.50am
Location: rm 341, Central King building
Credits: 3

Overview -

As industrial designers we are tasked with shaping new ideas and concepts into real and manufacturable products and solutions.

Without understanding the wide range of materials, manufacturing processes, and finishes available we cannot fully realize these ideas in their fullest and most useful forms. Additionally the continual development of new materials and manufacturing techniques can provide great inspiration and opportunities for the next generations of design solutions and product ideas.

Students will be charged with their own research and analysis of information for presentation to the class and subsequent discussion.

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Course objectives

Throughout the course, we will examine a range of materials and manufacturing processes and discuss their attributes and suitability for varying applications. Students will be expected to prepare and present research on materials and technologies and present this work in a convincing manner.
This will allow each student to focus on the following objectives:

• To develop an awareness of various materials that designers have at their disposal.
• To gain an understanding of the ways in which materials can be processed, formed and combined through manufacturing methods into products.
• To develop an understanding of the properties, advantages, and opportunities that these materials and processes offer.
• To gain and understanding of the energy and resources used in obtaining these materials, and the requirements and effects of the varying processes.
• To gain an understanding of the after-manufacture effects of varying materials and processes.
• To develop research strategies for gaining knowledge on materials and processes relative to future project and design needs.
• To develop methodologies for decision making on appropriate materials and process choices in the design process based upon knowledge gained in this course and subsequent research.
• To develop a personal sense of curiosity, scrutiny and applicable knowledge for materials and processes that can be applied to future design work.
• To develop the communication and presentation skills required to share and discuss this gained knowledge.

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Course structure and schedule

All students are expected to attend all classes, and participate in group-discussions.
Student presentations are a mandatory part of the course and should be seen as an invaluable opportunity for learning
Project assignments will be issued throughout the semester. Each assignment is due at the beginning of the class on the due date for review. Students should always be prepared to present their work to the class.
Each entire project assignment should be submitted in digital form, at the beginning of each review.
The following schedule may be subject to change throughout the course, and it is the student's responsibility to attend class and keep track of changes..

Week	date	
1	3 and 5 Sept 2024	Course introduction. Material/production value.
2	10 and 12 Sept 2024	Metals.
3	17 and 19 Sept 2024	Assignment 1. Metals.
4	24 and 26 Sept 2024	Metals.
5	1 and 3 Oct 2024	Assignment 2.
6	9 and 10 Oct 2024	Assignment 2. Plastics.
7	15 and 17 Oct 2024	Plastics.
8	22 and 24 Oct 2024	Plastics.
9	29 and 31 Oct 2024	Assignment 3. Ceramics
10	5 and 7 Nov 2024	Ceramics. Organics.
11	12 and 14 Nov 2024	Organics. Rapid prototyping/manufacturing.
12	19 and 21 Nov 2024	Rapid prototyping/manufacturing. Smart materials.
13	26 Nov 2024	Assignment 4.
14	3 and 5 Dec 2024	Composites & Hybrid materials.
14	110 Dec 2024	Nano materials
14/15	12, 17, and 19 Dec	reading and exam weeks*

* No exam will be set for this course

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Course reading and resources

A portion of the course is devoted to the study of relevant literature and information on material technologies.
This resource list will be expanded upon throughout the course.

Essential reading -

• Thompson, R. 2007. Manufacturing processes for design professionals. New York: Thames & Hudson

• Ashby, M and Johnson, K. 2010. Materials and design, The art and science of material selection in product design. UK: Butterworth-Heinemann

• Lefteri, C. 2019. Making it: manufacturing techniques for product design, 3rd edition: pub - Laurence King Publishing

• Thompson, R. 2011. The manufacturing guides - prototyping and low-volume production. New York: Thames & Hudson

Recommended supplemental reading -

• Sauer, C. 2010. Made of... New materials sourcebook for Architecture and design. Berlin: Gestalten

• Brownell, B 2017. Transmaterial next: a catalog of materials that redefine our future. New York: Princeton Architectural press

• Howes, P. 2012. Material matters: new materials in design. London: Black Dog Pub

• Axel Ritter. 2006. Smart materials in architecture, interior architecture, and design: pub -Birkhäuser Architecture

• Thorsen Klooster. 2009. Smart surfaces and their application in architecture and design: pub - Birkhäuser Architecture

• Ezio Manzini, 1989. The material of invention: Material and design: pub - The MIT Press

• Kula, D. , Ternaux, É & Hirsinger, Q. 2013. Materiology: The Creative Industry's Guide to Materials and Technologies: pub - Birkhäuser.

• Beylerian, G & Dent, A. 2007. Ultra Materials: How Materials Innovation is Changing the World: pub - Thames & Hudson

• Adrian Forty, 1992. Objects of Desire: Design and Society Since 1750: pub - Thames & Hudson

Evaluation

Grades for each project are initially assessed within four days of the project being submitted for review. Final grades will be determined at the end of the semester, with the complete submission of the work for the entire semester; it will include an assessment of your individual participation (including factors such as, but not limited to, promptness, preparedness and continued attendance of class and lectures, presentation of work reviews, engagement and involvement with the class teachings), and standard of digital documentation.

Grades are determined according to the instructor's judgment of how well students achieve the objectives of the course, and specific objectives and requirements of each project assignment. All group reviews of student work are a mandatory part of the course and should be seen as invaluable opportunities of learning. Although these sessions may inform the grading by the instructor, grades are not determined by the reviews.

The value of each project assignment, as a percentage of your total evaluation for this course, is as follows:

Assignments

• Assignment 1	8%
• Assignment 2	22%
• Assignment 3	8%
• Assignment 4	22%
• Quizes (3)	20%
• Individual participation	12%
• Digital documentation	8%

Course Grade System

• A (4.0)	superior
• B+ (3.5)	excellent
• B (3.5)	very good
• C+ (3.5)	good
• C (3.5)	acceptable
• D (3.5)	minimum
• F (3.5)	inadequate

Important Note - see page 7 for additional remification on grades for misses classes

Digital documentation.

Digital documentation of the entire work of the semester will be required of each student.
The documentation for each assigned project is to be submitted on the day of each review, before presentations, and in adherence with the deadlines noted in the assignment.

This documentation will provide the department with a review of your study, and information contained in the digital files might be used in future electronic or printed media publications, either in whole or in part. This record will also enable interested students, faculty, and others to have access to your work in the future. Please be advised that it is highly recommended that you make a copy of the digital package for your own records. The instructor will give detailed instructions on how to submit the documentation.

The digital documentation for this class has the following requirements -

- Submissions should be made for each assignment through canvas.
- Files should be in PDF format with additional details to be provided within the assignment.
- Files should not exceed 10Mb and should be suitably sized to allow for ease of upload and download without compromising the image quality or legibility of the document
- All citations should be in Chicago style - https://www.chicagomanualofstyle.org/tools_citationguide.html

This digital documentation will be evaluated in relation to the stated objectives of the course and a demonstrative consideration of:

- The quality and legibility of the chosen images.
- The appropriateness of the images in relation to the objectives of the study.
- Selective documentation of the whole work, and significant parts of the project.
- Evidence of ambitious and thorough research.
- Craft and quality of writing.
- Adherence to the requirements listed above

Note - **all work will be subject to a Plagiarism review as per NJIT policy**. Plagiarism is taken very seriously and if found an F grade may be issued.

As designers it is imperative that we arrive at original thoughts and ideas,
and while research involves the collection of data, influential examples, and outside references,
these should all be cited to the originator/s.
While collaboration and group endeavors are a necessary part of our process,
meaningful and progressive thought (ideas, opinions, and reasoning) should always be the designer's own.

Kepler Documentation:
You will receive more information regarding how many files to post on Kepler. All files must be resized and renamed. Do NOT upload folders! Please fill out all of the metadata information. The maximum size is 2000 x 2000 pixels. Images must retain their original proportions without being enlarged. In cases where the width to height ration exceeds 3:1 you may resize the short dimension to 2000 pixels. To distinguish PROCESS documents from FINAL documents, be sure to enter labeling information in the pull-down metadata section built into each Kepler file. The filename should be saved according to the following naming convention: <Lastname, Firstname ##.jpg>. You must login into the NJSOA network to fulfill this portion of the assignment. The guidelines described here, are in place to promote economical representations of student work and to ensure the sustainability of the Kepler system. Grossly oversized images will be deleted without notice and will not be considered for grading purposes. You must submit your PowerPoint slides as jpgs. It is good practice to keep the images at 72 dpi. You will not receive your final grade until you submit.

Attendance:
Attendance will be taken during each class and is an explicitly required component of all on-campus/location-based classes for all students in the College of Architecture and Design. After three absences students may be docked one-half grade for each subsequent unexcused absence. In other words, if the final grade would have been an "A", it results in a "B+". Similarly, a "B+" is reduced to a "B", and so on. There is a one-half grade penalty for each absence after the third. In the case of illness or other special circumstance, notification should be given to the instructor as soon as possible and before the date in question. The instructor has to be notified at the beginning of the semester if a student will miss a session (or more) due to religious observance. Student-athletes are required to attend all classes. A student-athlete may only miss class when representing NJIT in intercollegiate competition. No student-athlete may miss any regularly scheduled classes for any practice activities.

Tardiness:
Students are expected to arrive to class on time. The time limit that constitutes an absence versus tardiness is 10 minutes.

Late work:
Project assignments and digital documentation of your work are due at the beginning of class on the specified dates. Students should make every effort to avoid incomplete work and late submissions. Late submissions are not acceptable, except in the case of documented illness or special circumstances.
Last day to withdraw: Please note that the 11th of November 2024 is the last day to withdraw from this course.

Students with Disabilities:
Students seeking accommodations due to disabilities are required to notify the instructor at the beginning of the semester.

Academic Integrity:
Academic integrity and honesty are of paramount importance. The NJIT Honor Code will be upheld, and any violations will be brought to the immediate attention of the Dean of Students. Please visit the following website: http://www.njit.edu/academics/integrity.php Links to an external site.

Cell Phone Policy
The use of cell phones during class time is only permitted for emergencies.