

**ACAD 240 Materials: From Denim to Nanotubes**

**Units: 4**

**Spring 2020:**

**Section 10227 T/TH 10-12PM**

**Location:** IYH 212

**Instructor:** Adam Hughes

**Office: IYH 212**

**Office Hours:** T/TH,5:00 – 6:00 pm IYH 212

**Contact Info:** [adamhugh@usc.edu](mailto:adamhugh@usc.edu) cell:9096336182 (text)

**IT Help:**

<https://uscedu.sharepoint.com/sites/IYAStudent/SitePages/IT-Resources.aspx>

**Hours of Service: 9 a.m. – 6 p.m.**

**Contact Info: iyahelp@usc.edu**

**USC Technology Support Links**

[Zoom information for students](https://keepteaching.usc.edu/students/student-toolkit/classroom/zoom/)

[Blackboard help for students](https://blackboardhelp.usc.edu/students/)

[Software available to USC Campus](https://software.usc.edu/)

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**Course Description**

Covers the fundamentals of materials science and introduce students to the principles of designing with specific materials in mind.

**Learning Objectives and Outcomes**

This course is all about how to select the best material for the product that is being designed – including sustainability.

* Understand materiality & sustainability
* Understand how shaping and joining affect material surfaces
* Understand a process by which materials can be creatively selected
* Understand how stress and strain affect materials
* Understand the microstructure of materials
* Understand how materials can be used sustainably
* Understand material failure
* Understand material manunfacturing techniques

**Prerequisite(s):** none

**Required Readings and Supplementary Materials**

**Required Textbook**

**Optional Textbooks**

Introduction to Materials Science for Engineers, James F. Shackelford, 8th edition, ISBN 978-0-13-382665-4

Sustainable Materials Processes and Production, Rob Thompson, ISBN 978-0-500-29071-2

Radical Matter, Kate Franklin and Caroline Till, ISBN 978-0-500-51962-2

### Materials and Design: The Art and Science of Material Selection in Product Design, Mike Ashby and Kara Johnson, third edition, ISBN 978-0-08-098205-2.

**Website**

All course material will be on Blackboard: blackboard.usc.edu

**Grading Breakdown**

Including the above detailed assignments, how will students be graded overall? Participation should be no more than 15%, unless justified for a higher amount. All must total 100%.

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| **Assignment** | **Points** | **% of Grade** |
| Assignments (4) | 400 | 40% |
| Final Project | 200 | 50% |
| Participation/Discussion/Attendance | 100 | 10% |
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**Grading Scale**

Course final grades will be determined using the following scale

A 94-100

A- 90-93

B+ 85-89

B 80-84

B- 76-80

C+ 70-75

C 65-69

C- 60-64

D 51-59

F 50 and below

**Assignment Submission Policy**

All assignments are to be submitted through Blackboard. The format of the course does not allow for late assignments. Late assignments will not be graded, unless you receive prior permission from the instructor.

**Grading Timeline**

My plan is to have all assignments graded within one week of the due date.

**Academy Attendance Policy**

The Academy maintains rigorous academic standards for its students and on-time attendance at all class meetings is expected.  Each student will be allowed two excused absences over the course of the semester for which no explanation is required. Students are admonished to not waste excused absences on non-critical issues, and to use them carefully for illness or other issues that may arise unexpectedly.  Except in the case of prolonged illness or other serious issue (see below), no additional absences will be excused. Each unexcused absence will result in the lowering of the final grade by ⅓ of a grade (e.g., an A will be lowered to A-, and A- will be lowered to a B+, etc.). In addition, being tardy to class will count as one-third of an absence. Three tardies will equal a full course absence.

Students remain responsible for any missed work from excused or unexcused absences.  Immediately following an absence, students should contact the instructor to obtain missed assignments or lecture notes and to confirm new deadlines or due dates.  Extensions or other accommodations are at the discretion of the instructor.

Automatically excused absences normally many not be used for quiz, exam or presentation days.  Using an excused absence for a quiz, exam or presentation, such as in the case of sudden illness or other emergency, is at the discretion of the instructor.

In the case of prolonged illness, family emergencies, or other unforeseen serious issues, the student should contact the instructor to arrange for accommodation. Accommodation may also be made for essential professional or career-related events or opportunities.  All accommodations remain at the discretion of the instructor, and appropriate documentation may be required.

**Academic Conduct**

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one’s own academic work from misuse by others as well as to avoid using another’s work as one’s own. All students are expected to understand and abide by these principles.

SCampus is USC’s Student Guide to Policies and Conduct Code and can be found at http://scampus.usc.edu/. Section 11 contains the Behavior Violating University Standards and Appropriate Sanctions and can be found at http://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions/. Students will be referred to the Office of Student Judicial Affairs and Community Standards (SJACS) for further review, should there be any suspicion of academic dishonesty. The Review process can be found at http://www.usc.edu/student-affairs/SJACS/.

An academic integrity tutorial can be found at

<http://www.usc.edu/libraries/about/reference/tutorials/academic_integrity/index.php>.

**Course Schedule: A Weekly Breakdown**

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|  | **Topics/Daily Activities** | **Readings and Homework** | **Deliverable/ Due Dates** |
| Week 1 | Course Introduction + Syllabus  IYH Lab Certification | Ch 1 | T – Intro + Syllabus  Th – IYH Lab Cert |
| Week 2 | What Influences Product Design?  Materiality, Design, and Creativity | Chs. 2 -3 | T – Lab - PaperTh - Fabric Project |
| Week 3 | Material Selection  Manufacturing: Shaping, Joining and Surfaces  Project Presentation | Chs 4-5 | T -Lab – AL discussion  Th - Fabric Due |
| Week 4 | Sustainable Materials, Processes and Production: Part 1 - Materials | SSMP Part 1 | Lab - Lattace  T – Polymer Project |
| Week 5 | Form Follows Material; Material Selection  Project Presentation | CH 6 -7 | T-Lecture  Th-Ploymer Project Due |
| Week 6 | Introduction to sustainable Materials | SSMP Par2 | Wood Project |
| Week 7 | Creativity Lesson  Project Presentation | PPT | Th - Wood Project Due |
| Week 8 | **Midterm**  **Midterm Review – Project Brainstorm** |  | T – Metal Casting Project  Th - Lab time |
| Week 9 | Lab workshop session \* IYH lab |  | T – Lecture  Th – Lab Time |
| Week 10 | Project Presentation  Stress and Strain: Why things Break | MSE CH1, Ch6 | T - Metal Project Due |
| Week 11 | Fatigue  FEA | MSMD Ch 3, MSE CH2-3, Solidworks | Final Project Start Date  LAB -BiMetalic Strip |
| Week 12 | Manufacturing Teachniques: Machining & Injection Molding | PPT – Various sources |  |
| Week 13 | Manufacturing Teachniques: Forging Casting Laser WaterJet | PPT – Various sources | Th - Final Project Final Submittal - Presentaion |
| FINAL | Final EXAM – Research Paper on Manufacturing Techniques - Take Home |  | Date: For the date and time of the final for this class, consult the USC *Schedule of Classes* at [classes.usc.edu/](https://classes.usc.edu/). |

**Statement on Academic Conduct and Support Systems**

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In the case of prolonged illness, family emergencies, or other unforeseen serious issues, the student should contact the instructor to arrange for accommodation. Accommodation may also be made for essential professional or career-related events or opportunities.  Additionally, students who need accommodations for religious observations should provide advanced notice to instructors and student athletes should provide Travel Request Letters. All accommodations remain at the discretion of the instructor, and appropriate documentation may be required.

*Fall 2022 addendum:*

* Unless students provide an accommodation letter from USC’s Office of Student Accessibility Services (OSAS) or a letter from IYA Student Services detailing visa or travel restrictions, attendance and active participation is expected in the classroom. Any student with such accommodations should submit their accommodation document to the instructor as soon as possible to discuss appropriate accommodations. Either classroom recordings or live remote access to the class via Zoom will be provided.
* Students who are experiencing illness should not attend class in person. Please inform the instructor in advance of any class sessions that you can’t attend for medical reasons, and accommodations will be arranged to view recorded lectures and submit alternatives to any missed class participation. Students will not be penalized for not attending class in person under these circumstances.
* In the event that you find yourself experiencing COVID-19 related symptoms, in keeping with university recommendations, you should Stay home! This is the best way to prevent spreading COVID-19 as supported by scientific evidence; Please do not come to an in-person class if you are feeling ill, particularly if you are experiencing symptoms of COVID-19.

**Iovine and Young Hall Cleanout**

The Academy is unable to store student projects and materials beyond the end of the semester. Students must remove all projects and personal materials from the Creators Studio, lockers/locker room, and other classrooms by the end of each semester. **All projects and materials left in Iovine and Young Hall will be discarded two days after final exams end. No exceptions.**