

Course Syllabus

[Jump to Today](#)

 [Edit](#)

ALL THAT GLITTERS: INVESTIGATING THE EXPRESSIVENESS OF MATERIALS

Physical information pervades the world and it is through its continuous production that matter may be said to express itself.

Description

Materials are as varied as water, gold and whiskers. We understand their qualities without measurement or thinking. Materials are simple, ineffable facts. They are the nouns of our world. How can we talk about the differences between materials? One way is to measure and weigh them. This is the **quantitative** approach, and it has been very successful in our conquest of the world. What if you wished to describe materials without resorting to rules and balances? Could we understand materials by describing their characteristics? What will we learn by appreciating the expressive qualities of materials? Could we understand materials using the same measures we use to evaluate living things?

We will study ceramics, metals, minerals, wood, textiles, bone and plastics. We will advance by using the tools at hand. Use your eyes and ears, your fingers and smart-phones to evaluate materials. We do not wish to anthropomorphize materials: we want them to stand on their own without reference to others.

What makes materials expressive? How do materials behave differently from one another? How might we talk about the character of materials? Let's assume that materials are mass assemblies of tiny parts. The parts are so tiny that they exist in a world beyond our ability to observe. We appreciate them as the aggregated forms we know as materials. These parts have relationships with one another. Together the microscopic interactions grant character to a material. The aggregated parts and interactions describe the **expressiveness** of these materials.

We will measure and record the structural, spectral and acoustic characteristics of materials. We will describe light absorption, acoustic resonance, thermal and electrical conductivity, elasticity and hardness of each materials. We will imagine the microstructures We will make tools to refine our senses.

Requirements

You are expected to **come to class** and to participate in discussions, debates and labs.

Readings will be assigned each week and a quiz will be available on each reading.




















Quizzes are optional; doing them will boost your grade and make you eligible for a high pass.



I will ask to see your sketches/descriptions. Please **buy a notebook** to keep these sketches, descriptions, debate and lab notes.




















Some weeks you will bring in an example of something that goes with the week's theme. Let's call this an ***investigation***. We will begin by describing its qualities, sketching how it looks on a microscopic scale, and trying inquiries to identify the source of the quality. Three of you will present your findings each week. The three presenters will be scheduled in the third week.

Assignments Summary:

Date	Details

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Wed Sep 14, 2016	 INTRODUCTION: Scale, the Expressiveness of Materials https://canvas.instructure.com/calendar?event_id=1180352&include_contexts=course_1073662 12am
	 SLIDE SHOW: the scale of materials (https://canvas.instructure.com/calendar?event_id=1180353&include_contexts=course_1073662) 12am
	 READ: ch1 The New Science of Strong Materials: THE QUESTIONS https://canvas.instructure.com/courses/1073662/assignments/5274357 due by 11:59pm
Wed Sep 21, 2016	 LECTURE: AGGREGATES (https://canvas.instructure.com/calendar?event_id=1180354&include_contexts=course_1073662) 12am
	 READ: Manuel Delanda (https://canvas.instructure.com/calendar?event_id=1180355&include_contexts=course_1073662) 12am
	 CLASS EXERCISE: Draw/Describe the interior of a bag of Chex Mix https://canvas.instructure.com/courses/1073662/assignments/5351225 due by 11:59pm
Wed Sep 28, 2016	 ACTIVITY: Draw the interaction between graphite and paper https://canvas.instructure.com/calendar?event_id=1180357&include_contexts=course_1073662 12am
	 LECTURE: Hard and Soft (https://canvas.instructure.com/calendar?event_id=1180356&include_contexts=course_1073662) 12am
	 CLASS EXERCISE: Draw the inside of a package of malted milk balls. https://canvas.instructure.com/courses/1073662/assignments/5356870 due by 11:59pm
	 READ CH8 Stuff Matters: GRAPHITE (https://canvas.instructure.com/courses/1073662/assignments/5276778) due by 11:59pm
	 READ: Materials a VSI, "Soft" (https://canvas.instructure.com/courses/1073662/assignments/5321536) due by 11:59pm
Wed Oct 5, 2016	 LECTURE: Cool and Warm (https://canvas.instructure.com/calendar?event_id=1180359&include_contexts=course_1073662) 12am
	 LAB: Melting ice (https://canvas.instructure.com/courses/1073662/assignments/5366921) due by 7pm
	 READ CH5 Stuff Matters: FOAM (https://canvas.instructure.com/courses/1073662/assignments/5276775) due by 11:59pm
	 READ: Materials_VSI, "Hot and Cold" (https://canvas.instructure.com/courses/1073662/assignments/5321550) due by 11:59pm
Wed Oct 12, 2016	 LAB: The Gecko's Foot (https://canvas.instructure.com/calendar?event_id=1180362&include_contexts=course_1073662) 12am
	 LECTURE: Sticky, Greasy, Dry, Powdery (https://canvas.instructure.com/calendar?event_id=1180361&include_contexts=course_1073662) 12am
	 READ: Human climbing with efficiently scaled gecko-inspired dry adhesives https://canvas.instructure.com/courses/1073662/assignments/5321541 due by 11:59pm
	 LAB: What would paper look like to a flea? (https://canvas.instructure.com/courses/1073662/assignments/5274353) due by 11:59pm

Date	Details	
Wed Oct 19, 2016	 READ: ch6 Stuff Matters: PLASTIC (https://canvas.instructure.com/courses/1073662/assignments/5274361)	due by 11:59pm
	 LECTURE: Resonance (https://canvas.instructure.com/calendar?event_id=1180363&include_contexts=course_1073662)	12am
	 WATCH: The Tacoma Narrows Bridge (https://canvas.instructure.com/calendar?event_id=1180364&include_contexts=course_1073662)	12am
	 QUIZ: Plastics (https://canvas.instructure.com/courses/1073662/assignments/5274344)	due by 4:59pm
	 QUIZ: Waves (https://canvas.instructure.com/courses/1073662/assignments/5274345)	due by 7:59pm
Wed Oct 26, 2016	 LAB: Find the resonant frequency of materials (https://canvas.instructure.com/courses/1073662/assignments/5321544)	due by 11:59pm
	 LECTURE: Strong (https://canvas.instructure.com/calendar?event_id=1180365&include_contexts=course_1073662)	12am
	 READ: CH1 Stuff Matters: STEEL (https://canvas.instructure.com/courses/1073662/assignments/5276770)	due by 11:59pm
Wed Nov 2, 2016	 READ: The New Science of Strong Materials, "Stiff and Strong" (https://canvas.instructure.com/courses/1073662/assignments/5322449)	due by 11:59pm
	 LECTURE: Fluid (https://canvas.instructure.com/calendar?event_id=1180366&include_contexts=course_1073662)	12am
	 LAB: Buoyancy (https://canvas.instructure.com/courses/1073662/assignments/5321553)	due by 11:59pm
Wed Nov 9, 2016	 LECTURE: Elastic (https://canvas.instructure.com/calendar?event_id=1180367&include_contexts=course_1073662)	12am
	 IN CLASS EXERCISE: code your plastic (https://canvas.instructure.com/courses/1073662/assignments/5274351)	due by 6pm
	 READ: The New Science of Strong Materials, "Elasticity and the Theory of Strength" (https://canvas.instructure.com/courses/1073662/assignments/5322468)	due by 11:59pm
Wed Nov 16, 2016	 LECTURE: Metallics (https://canvas.instructure.com/calendar?event_id=1180368&include_contexts=course_1073662)	12am
	 READ: The New Science of Strong Materials, "Metallics" (https://canvas.instructure.com/courses/1073662/assignments/5321554)	due by 11:59pm
Wed Nov 23, 2016	 THXGVNG (https://canvas.instructure.com/calendar?event_id=1180369&include_contexts=course_1073662)	12am
	 QUIZ: The invention of color (https://canvas.instructure.com/courses/1073662/assignments/5274348)	due by 4:59pm
	 WATCH: Philip Ball on the history of pigments: COLOR (https://canvas.instructure.com/courses/1073662/assignments/5274366)	due by 11:59pm

Date	Details
Wed Nov 30, 2016	 LECTURE: Heavy (https://canvas.instructure.com/calendar?event_id=1180370&include_contexts=course_1073662) 12am
	 READ CH3 Stuff Matters: CONCRETE (https://canvas.instructure.com/courses/1073662/assignments/5276772) due by 11:59pm
	 READ: ch2, Concrete and Culture: NATURAL OR UNNATURAL? (https://canvas.instructure.com/courses/1073662/assignments/5274358) due by 11:59pm
	 READ: Chapter 2, Sand: The Never-Ending Story: TRIBES (https://canvas.instructure.com/courses/1073662/assignments/5274365) due by 11:59pm
Wed Dec 7, 2016	 LECTURE: Brittle (https://canvas.instructure.com/calendar?event_id=1180371&include_contexts=course_1073662) 12am
	 [OPTIONAL ASSIGNMENT] Identify three artworks that followed discoveries in materials science (https://canvas.instructure.com/courses/1073662/assignments/5274355) due by 4pm
	 QUIZ: Sand: Individuals (https://canvas.instructure.com/courses/1073662/assignments/5274349) due by 4:59pm
	 READ: CH7 Stuff Matters: GLASS (https://canvas.instructure.com/courses/1073662/assignments/5276776) due by 11:59pm
	 READ: ch9 Stuff Matters: PORCELAIN (https://canvas.instructure.com/courses/1073662/assignments/5274363) due by 11:59pm
Wed Dec 14, 2016	 READ: Materials_VSI, "Ceramic" (https://canvas.instructure.com/courses/1073662/assignments/5321555) due by 11:59pm
	 LECTURE: Wooden / Fibrous (https://canvas.instructure.com/calendar?event_id=1180372&include_contexts=course_1073662) 12am
	 QUIZ: Paper (https://canvas.instructure.com/courses/1073662/assignments/5274347) due by 4pm
	 ACTIVITY: code the Chocolate (https://canvas.instructure.com/courses/1073662/assignments/5274350) due by 7:59pm
	 READ ch2 Stuff Matters: PAPER (https://canvas.instructure.com/courses/1073662/assignments/5274359) due by 11:59pm
	 READ: ch6 The New Science of Strong Materials: TIMBER AND CELLULOSE (https://canvas.instructure.com/courses/1073662/assignments/5274362) due by 11:59pm
	 READ: ch11 Stuff Matters: SYNTHESIS (https://canvas.instructure.com/courses/1073662/assignments/5274356)
	 READ: ch4 Stuff Matters: CHOCOLATE (https://canvas.instructure.com/courses/1073662/assignments/5274360)
	 READ: Chapter 1 Sand: The Never-Ending Story: INDIVIDUALS (https://canvas.instructure.com/courses/1073662/assignments/5274364)
	 Roll Call Attendance (https://canvas.instructure.com/courses/1073662/assignments/5351221)

