4.154 **Material *Imagination***

Discerning *Critical Materiality* in the (Troubled) Cradle of Civilization

DRAFT

Option Studio **2-8-11** Mon Thurs 1-4pm Room W41-3219
Prof **Mark Goulthorpe** *TA* **Trang Nguyen** *SMArchS*

Course Structure: *Collective Research Seeding Individual Invention*
As an architectural option studio, the course will be **part-seminar** / **part-fieldtrip** / **part-studio**.

Initially we'll engage in collective research that seeks to identify the *critical materiality of late-industrial civilization* (by discerning its *history* and *becoming*...) This will seed reflection on *essential* needs for contemporary *dwelling,* against a backdrop of Earth-systems *exhaustion*. Such insights aim to elicit speculative individual projects that each offer a new material + social counterpoint to current assumptions*: how might we dwell with material elegance?*

You'll imagine a small **material research retreat** + **its housing** as witness of a *new architecture*.

Field Trip: Exposing the (Troubled) Cradle of Civilization

Sheep Mountain anticline formation, Big Horn Basin, Wyoming

Around *Indigenous Peoples' Day*, we will travel to the effective origin-point of material extraction, to the serene geological basins of *Wyoming* that have captured organic and inorganic matter through eons of history: volcanic ash and pre-historic swamplands trapped in the folding anticline formations of its sublime landscapes. The arid upland geography exposes *deep time*, *human time*, *industrial time*; silent witness to *future time*, perhaps. As if the geology itself were a *formative architecture* that exquisitely massages base material property...

Native peoples thrived in these austere upland regions, adapting to the seasonal migrations of abundant fauna with a brilliant nomadic architecture, evolving respectful patterns of co-existence with nature, a pact of *seven-generation mindfulness*. The current landscape is quiet and largely deserted, which belies the *colossal* extraction of earth-surface materials offered up by its unique geological legacy, Wyoming exporting the highest tonnage of base materials of all 50 states. The desolation holds ominous portent of civilizational-scale material use, silent witness to contemporary modes of dwelling and the consumptive force of late-industrial voracity.

We will travel through *geological* landscapes, *sacred* landscapes, *extractive* landscapes, *infrastructural* landscapes, *remediated* landscapes, *preserved* landscapes – almost all in some way *contested landscapes* all set within the current *geo-political* landscape.

Wyoming perhaps the wilderness most haunted by invisible yet powerful Anthropocenic forces.

The goal of the field trip will be to understand the *history and becoming* of material production as we contemplate a *doubling* of buildings on earth by mid-century and an insatiable appetite for *energy*. We will expose the often-unseen billion-ton extraction of *bentonite, coal, gypsum, helium, methane, trona, uranium, water*… to try to discern *critical materiality* for C21st well-being, as a prelude to imagining more elegant modes of human habitation.

Critical materiality is likely elusive, or multiple, doubtless changing as we transition to a fully-digital (AI) paradigm. Volcanic plumes from the *Eocene* epoch 50 million years ago lightly sifted ash on the then sub-tropical swamplands, imbuing thick organic sediments with brilliant rare-earth particulate. Recently discovered, a new chapter of material *extraction opens* here*,* now in pursuit of *electronic performance*: coal, *cheaper than dirt*, become a jewel-like horde eliciting a new national-security gold-rush. This seems a far cry from the spiritual serenity of the age-old Native American *Medicine Wheel* - poised atop a windswept ridge overlooking the pitiless minerality of the *BigHorn Basin* - very different pursuits of wellbeing that we will weigh-up in their contested *poignancy*.

Noguchi*, Heart of Darkness* 1974

Isamu Noguchi's *Heart of Darkness*, exquisitely carved from a raw block of stone by industrial power tools, might serve as leitmotif of the studio ambition: to deploy *material imagination* to hone elegant new forms of dwelling against the eerily majestic backdrop of a despoiled nature. Its naming also invokes the apocryphal novel by Joseph Conrad that exposed the true horror of C19th exploitation of the Belgian Congo, a new salience in the intensifying competition for lithium, cobalt and other elements held vital to attain the exponential performativity of an *electrate epoch.*.

Poetics / Artwork / Architecture

These 3 phases of coursework each call for articulation of a *personal ethics* and *expression of: a* ***poetics of material imagination***, a ***landscape intervention***, and a ***salient material architecture***.

Jean Nouvel's *National Museum of Qatar*

Conceptually, we will explore the notion of *material imagination*, Gaston Bachelard's creative counterpoint to *formal imagination* that typifies the positivist and rational drives of industrial determinism. Deep immersion in the emotive fullness and technical nuance of *materiality*, he held, might offer new paths to thinking and doing – drawing innate property into creative praxis.

Equally, indigenous peoples' empathy with all *Earth systems* speaks to a mode of being that considers all living systems educational and nurturing to its newest and most naive inhabitants: this also a form of *material attunement*: "a *council* of pecan trees", the landscape as *verb* not as *adjective*… Might the notion of *honorable harvest* be applied to civilizational-scale material need against and increasingly stringent backdrop of planetary strain? *The Arapaho mine coal.*

The goal will be to contemplate alternative modes of *design* and *production*, and of *architecture itself*, by absorbing the vivid material insights offered by historic and contemporary aptitudes, whether from a billion-year geological unfolding of the far horizon or in a moment of penetrating nano-scale focal depth.

Each of you will discern a *critical materiality* and *architectural performance* for *C21st dwelling*: speculative and aspirational but offering a new *immanence*, one hopes.

Muse

Trona crystalline structure

Jean Nouvel *National Museum of Qatar*

Just north of Sheriden, on the scarred history and landscape of the C19th *Brook Mine* at the moment the transcontinental sweep of *I-90* (that originates in Boston) oversails the languid *Tongue River (its remoteness* nurturing species of prehistoric trout)*,* there is a small *carbon research center*, *iCAM*, that might serve as a muse of sorts, a simple *templum:* "*an open space* for *augural observation" (premonition*). Conceived as a research enclave to support speculative new uses of fossil organic ore (to value its legacy far more than as a fuel), its work led to inadvertent discovery of high concentrations of **rare earth materials** as the *National Energy Technology Labs* analyzed core samples of the earth. It's a magical dust that merits a distinct category in the periodic table, largely overlooked through history, some rare earth elements only discovered by *speculative* prediction of their existence. While strictly rare only in high concentrations, they've become essential for the unique properties each offers, their tacit performance subtending everyday communication and information processing globally. Like many critical materials, they're essentially unseen, yet *latent* within visions of full electrification and of *AI* potency, but requiring sophisticated extraction, processing and deployment as the base *architecture* of a digital epoch. Even their naming is fascinating:

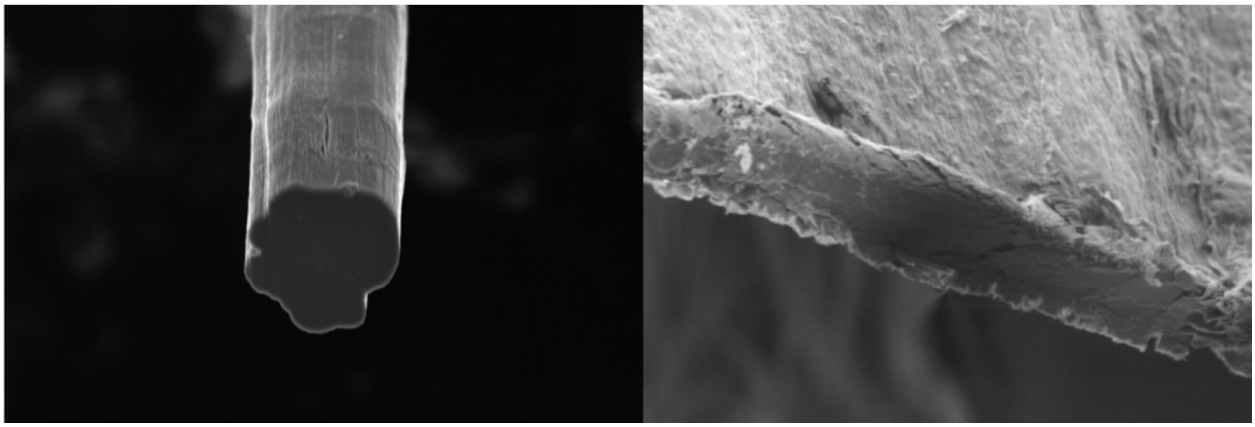
scandium, yttrium, lanthanum, cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, holmium, dysprosium, erbium, thulium, ytterbium, lutetium

Noguchi, the poet of raw natural material, unashamedly deployed the finessed brutality of contemporary power tools to attain new subtleties of sculptural form, teasing out its material *pathos*. You're tasked with pondering issues of contemporary production and material science, but now at the scale of *architecture* and *landscape.*

Where the famous Eames' video, *Powers of 10* captured scientific imagination some 50 years ago (already!), what order of magnitude is now needed to *absorb* and *express* detailed articulation of billion-year planetary history, a population of 10 billion humans, our deployment of materials at a billionth of a meter, or our routine computation via 10 billion transistors in an *iPhone*? All discernable in the catchment cradles of this fragile high-altitude Wyoming landscape: *base criticality, strategic criticality, performative criticality*, (likely others…)

3 Projects

Critical Materiality *Sept 10 - Sept 24 (pin-up Sept 17, review Sept 24)*



Carbon Nanotube

Engaged participation in *collective* absorption of the sheer scale and consequence of Wyoming's material extraction in relation to global material and energy consumption, and speculation on possible *critical materiality* to suit an emerging epoch.

Group Studies > graphic+verbal group testimony **10%**

Land Art *Sept 21 - Oct 5 (pin-up Sept 21, review Oct 5)*

Michael Heizer *City*

A landscape intervention that highlights the pathos and/or potency of the *history and becoming* of changing relations to the Earth exhibited by the peoples of Wyoming. This should also express a materiality that seems emergent or anticipatory in this *new Pliocene*.

Individual Design Project > graphic+plastic+verbal individual testimony **20%**

Research Retreat *Oct 15 – Dec 14 (pin-ups Nov 5 + Nov 23, review Dec 14)*

Saana *Research Center* Lausanne

A small *material research center* with *housing* for visiting researchers, placed in a Wyoming landscape you consider salient, that offers speculative material witness to an elegant new mode of dwelling. This should offer *social* as well *material* vision as a counterpoint to extant praxis.

Individual/Dual Design Project > graphic+plastic+verbal individual testimony **70%**

Pedagogy

Aims to nurture curiosity as to the base materiality that subtends contemporary architecture and the civilization-scale implication of its extraction and processing. To develop aptitude in balancing between contradictory cultural and ethical beliefs to then derive incisive (personal) precepts for an architectural project. To articulate a new *elegance of dwelling* that is mindful of late-industrial planetary strain. To reflect on design methodology by cupping an ear to nuanced thinking about human creativity (in light of technical change) that might elicit genuine *invention*.

ie to develop skills that anticipate architectural praxis as global population peaks (and falls), as environmental concerns become critical, and as cognitive aptitude and creativity evolves with AI.

Grading will follow MIT guidelines

A - exceptional understanding of the pedagogy + excellent creative response
B - good understanding of the issues exhibiting a solid creative response
C - average understanding of the issues showing a basic creative response
D - below graduate standards; grades of D do not count for graduate credit

Invited Participants

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Randall Atkins, *iCAM* Founder, *Ramaco Carbon* CEO/Chairman.
A charismatic and visionary mining executive, he will introduce the unlikely journey from derision towards coal mining, to intrigue in carbon material production, to euphoria for rare earth prospecting, and the many ironies that such discoveries compound.

Wes Martel, Senior Wind River Conservation Associate for the *Greater Yellowstone Coalition*. Martel served on the *Eastern Shoshone Business Council* for twenty years where he oversaw programs and legislation dealing with water, taxation, energy, and environment. He is a past Chairman of the *Fish and Game Committee* for the Shoshone and Arapaho Tribes and helped develop and implement the *Wind River Tribal Water Code* and *Game Code*. A crowning achievement is bringing back buffalo and moose on the *Wind River Reservation*.

Ed Conway, UK journalist with *The Times* and The Sunday Times, author of *The Material World*. With the enthusiasm of an amateur detective, *Material World* uncovers six foundational raw materials - sand, salt, iron, copper, oil, and lithium – whose fingerprints implicate their fundamental role in global technology and human civilization.

Robin Wall Kimmerer, SUNY Distinguished Teaching Professor at the *SUNY College of Environmental Science and Forestry* in Syracuse, NY and founding Director of the *Center for Native Peoples and the Environment.*

Reading List

Braiding Sweetgrass*: Indigenous Wisdom, Scientific Knowledge, and the Teachings of Plants*, 2013 by *Potawatomi* botany professor Robin Wall Kimmerer, about the role of indigenous knowledge as an alternative or complementary approach to Western mainstream scientific methodologies.

Material World*: A Substantial Story of Our Past and Future*, 2023 by British journalist Ed Conway. It explores six of the most vital raw materials that shape human civilization: sand, salt, iron, copper, oil, and lithium.

Noguchi*, Give and Take,* 1984

Navajo *Spring Creek Mine*, 2025

Dag Olav Hessen, *The Many Lives of Carbon, 2017* explores the essential role of carbon through planetary history, and its critical historic role in balancing oxygen and carbon dioxide in the atmosphere, holding them relatively stable until the Anthropocene. He also explains the polymorphic nature of carbon and its uniqueness among all the elements for its bonding versatility and polymeric genius (the basis of life).

Le Corbusier, *Towards a New Architecture,* 1923. One of the seminal manifestos that gave conceptual and tectonic expression to a new materiality in architecture, critically developing the idea of the house as a machine for living, and five points for a new architecture. 100 year later, is the poet of reinforced concrete muse or nemesis?

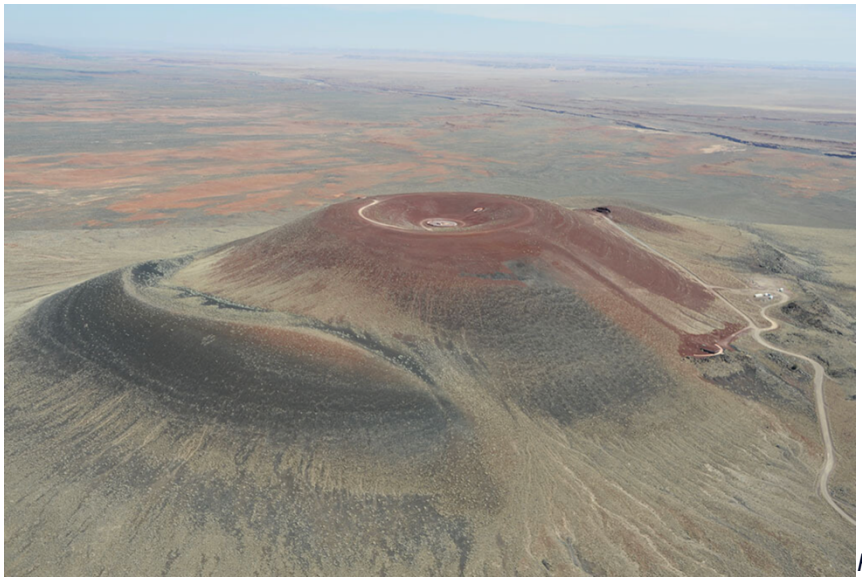
Background Reading

Gaston Bachelard, *The Psychoanalysis of Fire* (La psychanalyse du feu, 1938), *Water and Dream: An Essay on Imagination of Matter* (L'eau et les rêves,1942), *Air and Dreams: An Essay on the Imagination of* Movement (L'air et les songes,1943), *Earth and Reveries of Repose: An Essay on Images of Interiority (*La terre et les rêveries du repos, 1946), *Earth and Reveries of Will: An Essay on the Imagination of Matter* (La terre et les rêveries de la volonté, 1948)

Martin Heidegger, *The Question Concerning Technology* (*Die Frage nach der Technik*), 1954 discusses the essence of technology. Heidegger originally published the text in *Vorträge und Aufsätze*. *Only a God Can Save Us Now*, 1966 posthumous interview with *Der Spiegel*.

Wyoming: *extraction landscapes* in the cradle of civilization (bentonite, geo thermal steam, trona, coal)

Nodding Donkey 



Roden Crater, James Turrell