Science 1 Tour Script

NERPG Spring Event 2026

ACS Rubber Division – UConn Student Chapter

Written by Brenden Ferland, Chapter President

Thursday, March 19, 2026

1:00 to 2:30 PM | ~35 minutes per group

Rotating groups alongside poster session

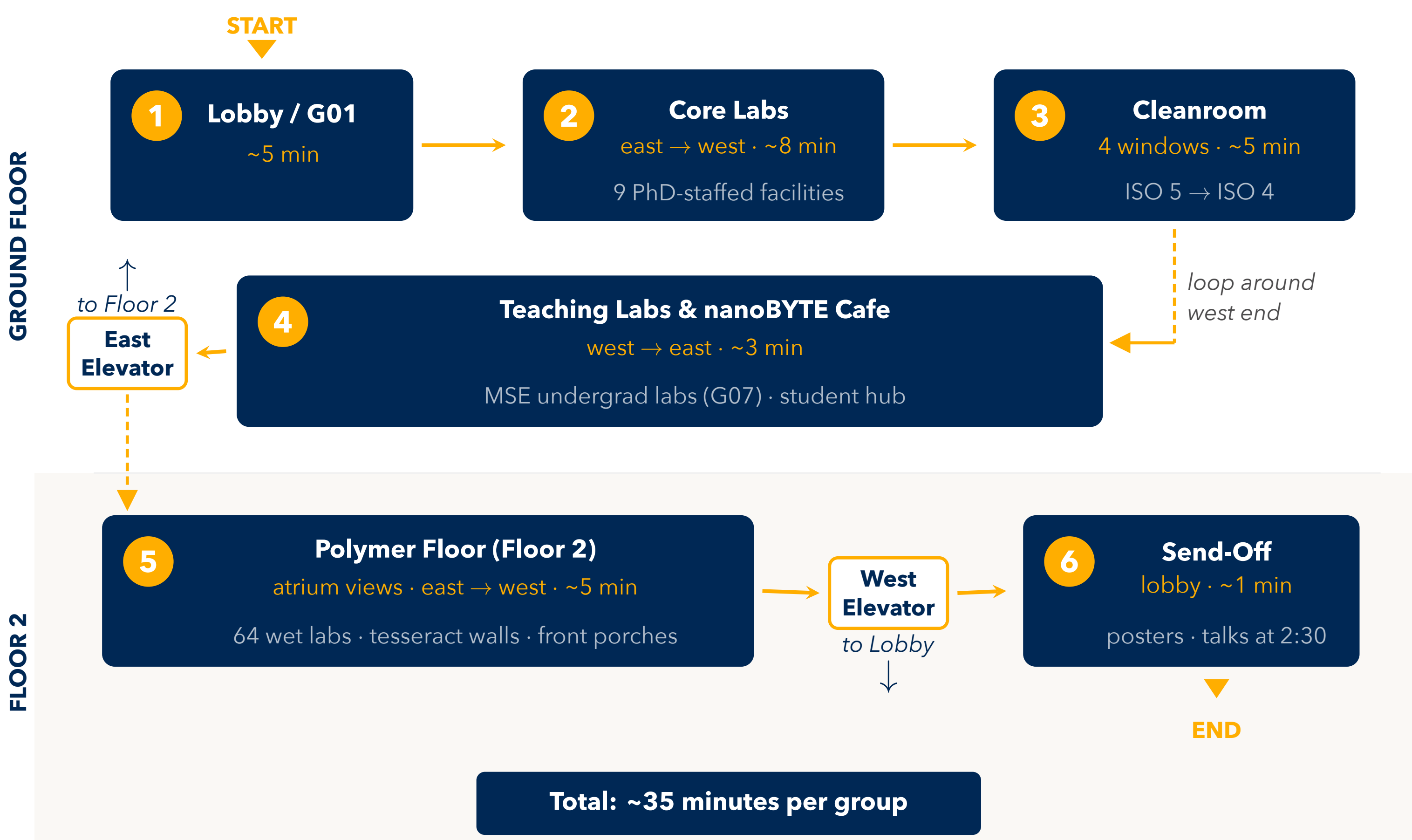
Institute of Materials Science | University of Connecticut

Before You Start

- Smaller groups are better. People get lost at doorways and can't see into lab windows with big groups.
- You don't need to hit every talking point. Read the room. If people are asking questions about the cleanroom, stay there longer and trim the upstairs walk.
- Don't read from this script. Know the bones, then talk like a person.
- If someone asks something you don't know: "I'm not sure, I can find out" is always a fine answer.
- **Design thread to weave throughout:** this building was designed around the idea that if you work in a beautiful space, your ideas will be beautiful. Every design choice (the glass walls, the woodland views, the open neighborhoods) serves that philosophy. It's not decoration. It's infrastructure for better thinking.

> " *Beautiful space, beautiful ideas.* "

Route Overview



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4
5
6

1 Stop 1: Lobby & G01 Active Learning Room

~5 min | ground floor, east end

▶ *Where you gather the group, set context, and show off the room you're standing in. ~5 min.*

The building

- Welcome to Science 1, UConn's newest research building. 198,000 square feet across three floors. Opened spring 2023, ribbon cutting June 15, 2023.
- Home to the Institute of Materials Science (IMS), which encompasses the Materials Science & Engineering Department, the Polymer Program, and Materials Science.
- IMS is one of the oldest materials science programs in the country, established in **1965 by an act of the Connecticut Legislature**. The state legislated it into existence. It's had only four directors in 60 years – the current director is Steve Suib.
- Currently **36 resident faculty and 95 affiliates** across 20 departments.
- The research floors, core labs, faculty labs, and student offices are all keycard-secured. You normally can't get past the lobby without authorization.
- Designed by **Payette** out of Boston, the 2019 AIA Architecture Firm Award winners. Science 1 itself has won three AIA design awards since opening.
- The philosophy behind the building: **if you work in a beautiful space, your ideas will be beautiful.** Everything you're about to see (the glass, the light, the open sightlines) was designed around that belief.

> " *If you work in a beautiful space, your ideas will be beautiful.* "

The room you're standing in

- This is a **204-seat active learning classroom**, open to the entire university, not just IMS. Classes are taught in here every day. We only got the room today because it's spring break.
- The tables are not off the shelf. They were custom designed by Payette with UConn's Active Learning Group. Five different shapes were modeled in Rhino and CNC-routed at full scale from MDF in Payette's fabrication lab.
- The winning design is called the **"canoe."** The curved form creates an implied center for student collaboration. Seats 6 with laptops. Power and data run through the legs.
- This room is based on the **SCALE-UP model** (Student-Centered Active Learning Environment for Undergraduate Programs), which merges lecture and lab into one space. UConn piloted it with 36-seat classlabs in the physics department. This is that concept scaled to 204 seats. Internally they called it "a SCALE-UP room on steroids."

1
2
3
4
5
6

Reminder: This is where the faculty presentations will be at 2:30 today.

Fun facts (pick one or two)

- It's called "Science 1" because there's supposed to be a Science 2, 3, and 4. The master plan identified space for up to four buildings here. This whole site used to be parking lots.
- Construction started **July 2020**, right into COVID. Building inspections were done over FaceTime.
- LEED Gold and SITES Silver certified. Energy use intensity of 108 kBtu/SF, which is **74% below the AIA 2030 baseline**. Remarkable for a building running cleanrooms and fume hoods.
- For context, IMS used to be in the Gant Science Complex. Gant's cumulative wall insulation R-value was 3.8. Connecticut building code requires R-15. The building was basically a tent.

Good quote (if it fits naturally)

> Sandra Shea-Crabb, UConn's project planner: *"I was skeptical about this space during design. I thought, no, this is just not going to work. The ceiling is too low, and the monitors are too far away. On completion, I realized it's amazingly intimate, and the sound quality is incredible. Everybody wants to teach in this space."*

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2 Stop 2: Core Lab Hallway (East to West)

~8 min | core lab hallway, east to west

> *"Let me take you into the core labs. This is where the shared instrumentation lives."*

> ▶ *Walk the group through at a steady pace, pausing at highlights. The hallway is the tour. ~8 min.*

The core labs are the shared instrumentation facilities available to all IMS researchers and industry partners. Each lab is labeled by the door (the names are painted on the walls) so just follow the hallway east to west and they'll naturally appear in order.

- Have the group look up. The pipes and utilities are deliberately exposed. The building runs **five water lines**: hot and cold potable water for sinks and water bottle fillers, hot and cold non-potable lab water that's treated and recycled at the Supplemental Utility Plant, and a dedicated Type 2 DI water line on tap in every lab.

1
2
3
4
5
6

HOW TO USE THIS SECTION: The bullet points are what you'd actually say. The ***If asked*** blocks underneath are reference material for follow-up questions. Don't volunteer them.

EIRC (Electrical Insulation Research Center)

- Characterizing electrical properties of insulating materials. If you're making rubber or polymer for cable, power distribution, or energy storage, this is where you'd test it.

If asked: Broadband dielectric spectroscope (10^{-4} Hz to 1 GHz, -70 to 300°C). Pulsed electroacoustic space charge profiling with 5-micron spatial resolution. Sawyer-Tower ferroelectric tester (±10 kV). DTC-300 thermal conductivity meter (ASTM E1530). High voltage test transformers, partial discharge system, film breakdown tester.

Electron Microscopy

- Imaging at the nanometer scale. For rubber and plastics people, this is how you'd look at filler dispersion, blend morphology, or a fracture surface.
- This room is separate from CAMMA (the Thermo Fisher microscopy center at the Innovation Partnership Building on Discovery Drive), which has a larger suite including FIB-SEM and advanced TEM/STEM.

NMR (Nuclear Magnetic Resonance)

- Molecular structure and dynamics at the atomic level. Big use case here is characterizing new monomers. If a research group synthesizes a novel monomer, NMR is how you confirm you actually made what you think you made. Also used for tracking molecular weight in living polymerizations and verifying copolymer composition.

If asked: Bruker Avance III 400 MHz wide-bore for solid-state (magic angle spinning, pulse field gradient diffusion). Bruker DMX 500 MHz for solution-state. Bruker EMX EPR for studying unpaired electrons.

AFM (Atomic Force Microscopy)

- Surface imaging at nanometer resolution using a physical probe tip. For polymers, you can map out phase separation in blends or do mechanical mapping of soft materials.
- The main AFM here (the Cypher ES) can image samples while they're submerged in liquid or being heated. So you can watch what happens to a polymer surface under real-world conditions, not just in a vacuum.

If asked: Four Asylum Research instruments (Cypher ES, Cypher S, MFP-3D-SA, MFP-3D-BIO). The Cypher ES has full environmental control: sealed gas/liquid cells, temperature 0–250°C, humidity control. blueDrive photothermal excitation keeps tapping stable during temperature sweeps and in liquid. Modes include conductive AFM, piezoresponse force microscopy, Kelvin probe, AM-FM viscoelastic mapping. Heated stage up to 300°C with humidity control on one MFP-3D.

X-Ray

- Diffraction and scattering for crystal structure and nanoscale morphology. For polymers: crystallinity, orientation, lamellar spacing. Critical for semicrystalline materials and rubber compounds with crystallizable segments.
- The main XRD (the Rigaku SmartLab) is their top-of-the-line model. It has a detector that can switch between point, line, and area modes on the fly, so one instrument handles everything from routine powder scans to thin film work without swapping hardware.
- **Worth mentioning:** the SAXS instrument has tensile and shear stages, so you can watch nanostructure evolve under deformation in real time. That usually gets a reaction from the rubber crowd.

If asked: Rigaku SmartLab, 9 kW PhotonMax rotating anode, HyPix-3000 2D detector (single-photon counting, $>10^6$ cps/pixel, dual energy discriminators for fluorescence suppression), Cross Beam Optics for parafocusing/parallel beam switching, in-situ stage to 1000°C. Bruker NanoStar SAXS, 6 kW rotating anode with temperature/tensile/shear stages, d-spacing 1000 to 2.2 Å. Bruker D8 Advance and D2 Phaser benchtop for routine powder work. Oxford Diffraction XCalibur PX Ultra for single crystals and fibers.

Thermal Analysis

- DSC, TGA, DMA. Measuring how materials respond to temperature. For rubber people, this is where you'd characterize vulcanization kinetics, cure behavior, or filler effects on Tg.
- This lab also houses some of IMS's newest equipment: the **Discovery X3 DSC** (released 2020) runs three samples at once, tripling throughput. The **DMA 850** floats its probe on an air bearing for frictionless movement; the displacement sensor can pick up motion smaller than an atom. And the **TGA-5500** uses an infrared furnace, so it can ramp over 600°C per minute for fast screening.

If asked: All TA Instruments. DMA Q800, DSC Q20 (-90 to 400°C, modulated DSC), TGA Q500 (up to 1000°C, 16-sample autosampler), SDT Q600 (simultaneous DSC+TGA), TMA Q400 (dimensional changes under load). Discovery X3 DSC: Fusion Cell + Tzero technology, -160°C to 450°C. DMA 850: 0.1 nm displacement resolution, optical encoder, 25 mm frictionless range, temperature-controlled transducer. TGA-5500: 8 ng balance resolution, 25-position autosampler, integrated Curie point calibration.

Mechanical Testing

- Tensile, compression, hardness, fatigue. The kind of data that ends up on a spec sheet. For rubber, you'd test elongation, tear strength, durometer hardness.
- The **Olympus DSX-1000** is worth pausing at. It's a digital microscope that does 3D surface profiling up to 7,000×. Basically hitting the limit of what you can do optically. It gives you AFM-style surface maps at the speed and cost of running an optical microscope. The sample needs to be matte, but for rubber and most polymers that's the default. One of IMS's newest and most impressive instruments.

> ***If asked: Instron 5869 and Shimadzu AGX-V for tensile/compression. Wilson Rockwell and LECO microhardness testers. Zygo New View 5000 optical profilometer for surface topography. Olympus DSX-1000: 20×–7,000× magnification, telecentric optics for accurate measurement at any zoom, 3D imaging ~10× faster than conventional digital microscopes, 60 fps live view, rotating head and stage (90° each direction), six observation modes (brightfield, darkfield, DIC, oblique, polarization, mixed). Released 2019.***

GPC / Molecular Weight

- Gel permeation chromatography. Separates polymer molecules by size to get molecular weight distribution. If you do incoming material QC or batch-to-batch consistency, this is how you'd verify molecular weight is on spec.

> ***If asked: Three GPC systems: Waters (1515 pump, 717Plus autoinjector), Agilent 1260 Infinity, Shimadzu LC. All calibrated against polystyrene or PMMA standards.***

Spectroscopy

- Identifying materials by how they interact with light. FTIR, Raman, UV-Vis. If someone in the group does quality control or failure analysis, this is bread and butter.
- The Spotlight 400 is a micro-FTIR that maps chemical composition spatially. Take a cross-section of a multi-layer film or a contaminated part and see exactly what's where, pixel by pixel. If anyone here does failure analysis, they'll appreciate that one.

> ***If asked: Three FTIRs: Perkin Elmer Spotlight 400 micro-FTIR (6.25/25/50 μm pixel sizes, MCT linear array detector, images 1×1 mm in under a minute at 25 μm, SNR $>$12,000:1, ATR imaging with Ge crystal down to 3 μm at 1000 cm^{-1}). Thermo Fisher Nicolet iS20, Nicolet Magna 560 (ATR, grazing-angle, transmission). Renishaw Ramascope 2000 Raman. Perkin Elmer Lambda 1050 UV-Vis-NIR. Agilent GC-MS for volatile/semi-volatile compounds.***

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2
3
4
5
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General talking points (weave in as you walk)

- Every core lab is **staffed by a full-time PhD scientist**. These aren't grad students running the instruments part-time. Dedicated professional staff.
- IMS runs an **Industrial Affiliates Program (IAP)** for companies that need characterization work done but don't want to buy the instrument and hire someone to operate it. If you see anything along here that would be useful for a one-off job, let Brenden know and he can put you in touch with the right person.
- These are **shared core facilities**; no single research group owns them. That's by design. It keeps the equipment maintained to a high standard and means any researcher in the building can use them with proper training.

3 Stop 3: Cleanroom Observation Windows (West End)

~5 min | west end, 4 windows

> *"At the end of this hallway we've got the cleanroom. You can see right into each bay through the observation windows."*

> ▶ *Four windows in sequence. Natural climax of the ground floor. ~5 min.*

Setup

- **2,000 sq ft under filter** with a 3,900 sq ft service area behind the walls.
- Four distinct research bays arranged in a linear sequence of **increasing cleanliness**. Each window looks into one bay. Walk the group along all four.

Window 1: Etching Bay (ISO 5)

- Material removal at micro/nano scale, patterning surfaces by selectively removing layers.
- ISO 5 means fewer than 100,000 particles (≥0.1 micron) per cubic foot.

Window 2: Deposition Bay

- Adding thin films and coatings onto substrates: sputtering, evaporation, chemical vapor deposition.
- Relevant to anyone doing surface modification or functional coatings on polymer substrates.

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Window 3: Characterization Bay

- Measuring and verifying what you just deposited or etched. Film thickness, surface roughness, electrical properties.

Window 4: Lithography Bay (ISO 4)

- The cleanest bay. ISO 4 is **10× cleaner** than ISO 5.
- Photolithography for patterning at micron and sub-micron scale. This is where you define the fine features.

Access context

- You can't just walk in. Access requires EHS training, then building safety training, then cleanroom safety videos plus a written exam, then instrument-specific training, and finally approval from the IMS Facilities Manager.
- Everyone inside is wearing full gowning: bunny suit, booties, gloves, hood.

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4 Stop 4: Teaching Labs & nanoBYTE Cafe

~3 min | teaching hallway, east

> *"Now let me show you the other side of the ground floor, where the students work."*

> ▶ *Loop around the west end to the teaching lab hallway. Walk east. The other spine of the ground floor. Quick walk-through heading east. ~3 min.*

Teaching Labs (G07)

- These are the **MSE undergraduate teaching labs**, all glass-walled so you can see in as you walk by.
- They have their own instrumentation: **two SEMs** (one with EDS), **AFM, DSC, TGA, FTIR**, micro/macro hardness testers, melt flow indexer, and an XRD on the way.
- Next door: **metallography lab** with grinding/polishing, hot mounting, etching, optical microscopy. And a **mechanical testing lab** with universal test frames, Charpy impact tester, rolling mill, and swager.
- Students run **Junior Design** (month-long projects they choose themselves) and **Senior Design** (real problems from industry sponsors with faculty mentors). The work is serious.

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- If you're hiring, this is where your future employees learned to use the equipment. The instruments in here mirror what you'd find in a corporate characterization lab.

> ***If asked: Six lab rooms (G07A through G07F) around a central breakout area (G07). G07A: Materials Characterization (2 SEMs, AFM, DSC, TGA, FTIR, MFI, hardness testers, Bruker D6 Phaser XRD planned). G07B: Thermal Processing (fume hoods, sand blaster, argon tube furnace, box furnaces, ADMET eXpert three-point bend). G07E: Metallography (grinding/polishing, hot mount, precision saws, optical imaging). G07F: Mechanical Testing (multiple universal frames, Charpy, rolling mill, swager). G07D: Project Room (3D printers, 3D Print Club). Student orgs: UConn Material Advantage (ACerS/AIST/TMS/ASM), 3D Print Club, Metal Working Club.***

nanoBYTE Cafe

- Right here on the ground floor, open to everyone. Originally this was in the Biophysics building, but IMS claimed it for Science 1. The biophysics people are still jealous.
- Good coffee. The name is a science pun they lean into.

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5 Stop 5: Floor 2, the Polymer Floor

~5 min | floor 2, walk east to west

> *"Let's head upstairs to the polymer floor."*

> ▶ *Take the east elevator to floor 2. Walk the floor east to west. The open atrium lets you see floor 1 below; point things out as you go. ~5 min.*

The Polymer Program

- This floor is home to the IMS Polymer Program. It's one of a small number of dedicated polymer graduate programs in the country, alongside places like Akron, UMass Amherst, and Case Western. About 80 M.S. and Ph.D. students, 19 faculty drawn from six departments: chemistry, chemical engineering, physics, materials science, biomedical engineering, and civil engineering.
- It's deliberately interdisciplinary. Students come in from different backgrounds and the first year gets everyone up to speed on polymer fundamentals. Admissions are competitive because students are typically fully funded and not required to teach, so they can focus on research.
- Directed by **Mu-Ping Nieh**. Graduates go to places like Henkel, Intel, Lanxess, Rogers Corporation, Raytheon, and the U.S. Naval Research Center.

The view down: floor 1 architecture

The open atrium means you can see the floor 1 highlights from up here without backtracking. Point them out as you walk:

- **Fishbowl conference rooms.** Glass-walled rooms on floor 1, fully visible from above. You can watch collaboration happening in real time. The transparency is intentional; research here isn't behind closed doors.
- **Polymer Processing lab.** Floor 1 houses the Rheology and Polymer Processing core facility. Probably the most relatable lab for the NERPG crowd: mixing, extrusion, compression molding, rheology. If you work with rubber or plastics, this is the lab that speaks your language.

> ***If asked: C.W. Brabender mixer (up to 400°C), Thermo Fisher Prism TSE 16 TC benchtop twin-screw extruder, Haake Minilab II micro-compounder (7 cm^3, co- and counter-rotating), Carver lab press (30 tons, up to 300°C), TA Instruments AR-G2 rheometer, Ametek Ox-Tran 2/12 oxygen transmission rate analyzer, Kayeness melt index tester.***

- **Double-height neighborhood spaces.** Between lab clusters on floor 1, the central spine opens into social areas with seating. One side overlooks the landscaped quad, the other faces preserved woodland. Designed for the accidental run-ins that lead to new ideas.
- This is the "beautiful space, beautiful ideas" philosophy made physical. Natural light, woodland views, open sightlines everywhere. The building wants you to look up from your work and see something worth thinking about.

> *" The building wants you to look up from your work and see something worth thinking about. "*

Tesseract Wall Pattern

- Look at the wall surfaces in the hallways. Geometric tessellated pattern inspired by a tesseract (4D hypercube).
- A subtle design detail that most people walk past without noticing. Once you see it, you see it everywhere.

Faculty Labs

- The upper floors house **64 wet labs** and **13 computational/dry labs**, organized into clusters along a central spine.
- **Faculty labs were designed by the faculty themselves**, not prefab layouts from Payette. Each is built to the exact specifications of the PI assigned to it, which leads to interesting variation from one door to the next.

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- Each lab cluster has a **recessed "front porch"** at its entry. Deliberately residential vocabulary applied to a research building, meant to lower the barrier to knocking on someone's door.

Mezzanine Offices

- Faculty offices sit on **intermediate mezzanine floors** (MZ1 and MZ2), tucked between the main floors.
- Offices went from ~150 sq ft in the old Gant building to a standardized 113 sq ft here. No exceptions. The project planner said faculty "weren't very pleased, even though we're going into a non-paper environment."
- But the chairs soften the blow. **$1,000+ Steelcase Gesture chairs** at every desk, and that's not just faculty. Grad student offices have them too.

Amenities (mention as you pass them)

- **Kitchenettes** on the upper floors. Filtered water on tap, fridge, microwave. Where half the real conversations happen.
- **Wellness room** at the east end of MZ1.
- **Meditation room** at the east end of MZ2.
- **Five showers** in the building, part of UConn's green mission to encourage cycling to work.

Infrastructure (weave in naturally)

- The building is served by a **Supplemental Utility Plant (SUP)** connected via ~1,100 feet of underground utility tunnel to UConn's Central Utility Plant. UConn generates its own power.
- The SUP provides **DI (deionized) water on tap** throughout the building. Critical for lab work; no need to generate it locally.
- Look for the **red electrical outlets**. Those are on a backup generator circuit. If UConn loses power, experiments on red plugs keep running without interruption.

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6 Stop 6: Back in the Lobby / Send-Off

~1 min | lobby, keep it brief

> *"That's the tour. Let me take you back down to the lobby."*

> ▶ *Take the west elevator down. ~1 min. Keep it brief; they want to go look at posters.*

> *"Thanks for walking through with me. The poster session is right here, and faculty talks kick off at 2:30 in this room. If any of those instruments caught your eye, grab Brenden and he'll connect you with the right people. Come find me if you have any other questions."*

> *" Grab Brenden and he'll connect you with the right people. "*

Bonus: Outside Walk (Weather Permitting)

> ▶ *March 19 could go either way. If it's nice out, take the group around the landscaping after the indoor tour. If it's cold, raining, or snowing, skip this entirely.*

- The boulders in the landscaping were **excavated during construction**. Literally from under the building, salvaged rather than trucked away.
- You're standing on a **glacial drumlin**, an Ice Age landform. Most of the site has 10%+ slopes.
- The bioretention gardens run 800+ linear feet and manage 8,600+ cubic feet of stormwater across five linked cells. Stone weirs between each cell manage flow along the natural slope.
- **Dedicated pollinator conservation area** with native plantings. Point out the pollinator bushes.
- **520 KW rooftop solar.** Can't see them from here, but they're up there.
- The existing hardwood woodland on the south side was **deliberately preserved** because the shade and habitat would take decades to replicate.

Quick Reference Card | Science 1 Tour, March 19, 2026

Building & IMS

Size	198,000 sq ft, 3 floors
Cost	~$220M (full project)
Opened	Spring 2023
Architect	Payette, Boston
IMS	Est. 1965 (state legislature)
Encompasses	MSE, Polymer, MatSci
Faculty	36 resident / 95 affiliate
EUI	108 kBtu/SF (74% < 2030)
Certs	LEED Gold, SITES Silver

Core Labs & Cleanroom

Core labs	10 (PhD-staffed)
CAMMA	Innovation Partnership Bldg
Cleanroom	2,000 sq ft, ISO 5–4
Classroom	204 active learning seats
Wet labs	64
Dry labs	13 computational
Solar	520 KW rooftop
DI water	On tap building-wide
Red outlets	Backup generator circuit

Polymer Floor & Misc

Program	~80 grad students, 19 faculty
Director	Mu-Ping Nieh
Depts	6 (Chem, ChemE, Phys, MSE, BME, CE)
SUP tunnel	~1,100 ft underground
Office size	113 sq ft (was 150)
Chairs	$1,000+ Steelcase Gesture (all)
Showers	5 (green mission)
Gant R-value	3.8 (code: R-15)

Cut along crop marks. Fold in thirds for pocket use.

Based on research compiled Feb/Mar 2026. Instrument details from UConn COR^{2}E (core.uconn.edu).