



UNM STEM-H Center *for*
Outreach, Research & Education

Scientific Equipment Lending Library Catalog of Items

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Thank you to our start up funding partners:



UNM STEM-H Center for Outreach Research & Education

Resource Center Lending Policies & Procedures

In support of STEM education in the state of New Mexico, the UNM STEM-H Center maintains a Resource Center to provide access to materials and technology that otherwise may be too expensive for area educators and/or youth organizations. There is no charge associated with using these materials and equipment.

- All requests for equipment must be made at least 3 business days in advance by email (stemed@unm.edu) or by calling 505-277-4916. Materials are available on a first come, first serve basis. Special circumstances may be accommodated.
- The standard loan period is two weeks, defined as the day borrowed to the same day of the week two weeks later. Loans may be extended providing there is no waiting list and that an extension will not interfere with an existing reservation.
- The borrower(s) is responsible for arranging pick-up and drop-off of borrowed items. Special arrangements may be made for delivery and pick-up of items by the Center staff on a case by case basis and within a 25 mile radius of UNM.
- Training for certain items may be required before the borrower is allowed to check them out. The Center will provide periodic training classes for these items.
- The loaned equipment remains the property of the UNM STEM-H Center and must be returned in the condition in which it was borrowed. While the Center is responsible for inspection of equipment during check-out and check-in, it is the expectation and responsibility of the individual borrowing the equipment to check for damage and/or missing pieces before leaving and to report missing and damaged equipment upon return.
- The equipment may not be loaned, sold, or otherwise disposed of, or used by other persons than the borrower/intended user(s), without express written approval of the UNM STEM-H Center. The Center shall not be liable for any claims, liabilities, damages, losses, costs, expenses (including but not limited to settlements, judgments, court costs and reasonable attorney's fees, fines and penalties) arising out of the use of an item borrowed.
- The individual borrowing equipment assumes full responsibility of the equipment and will be held accountable for the cost of lost or damaged items while in his/her possession. S/he will be charged for any damage or loss to the extent that further usage is impaired or impossible without replacement or repair. Individuals are forbidden to give equipment to others while it is signed out.

Failure to comply with the terms of this agreement may prevent future eligibility for loans and other services of the UNM STEM-H Center.



Lab Quest 2

Vernier LabQuest 2 is a standalone interface used to collect sensor data with its built-in graphing and analysis application. The large, high-resolution touch screen makes it easy and intuitive to collect, analyze, and share data from experiments. Its wireless connectivity encourages collaboration and personalized learning. You can also use LabQuest 2 as a computer interface using Logger *Pro* software for advanced analysis and video features..

Quantity Available: 10

Data-Collecting Probes and Sensors (compatible with the Lab Quest 2)



Colorimeter

This 4-wavelength Colorimeter measures the amount of light transmitted through a sample at a user-selectable wavelength in order to determine the concentration of a solution. Features such as automatic sensor identification and one-step calibration make this sensor easy to use. Fifteen 3.5 mL cuvettes are included.

Quantity Available: 10



CO₂ Gas Sensor

With this sensor, you can easily monitor changes in CO₂ levels occurring in respiration of organisms ranging from peas to humans. The CO₂ Gas Sensor measures gaseous carbon dioxide in two ranges: – 0 to 10,000 ppm and 0 to 100,000 ppm. A 250 mL respiration chamber with probe attachment is included for running controlled experiments with small plants and animals.

Quantity Available: 10



Conductivity Probe

The Conductivity Probe has three ranges, providing optimal precision in Uses include: demonstrating diffusion of ions through membranes; investigating the difference between ionic and molecular compounds, strong and weak acids, or ionic compounds that yield different ratios of ions; and measuring TDS, total dissolved solids.

Quantity Available: 10



Dissolved Oxygen Probe

The Dissolved Oxygen Probe is great for biology, chemistry, ecology, or integrated science courses. It can be used to perform a wide variety of experiments to determine changes in dissolved oxygen levels, one of the primary indicators of the quality of an aquatic environment. Calibrate in the units you choose: % dissolved oxygen, mg/L, or ppm dissolved oxygen.

Quantity Available: 10



Dual-Range Force Sensor

The Dual-Range Force Sensor is a general-purpose sensor for measuring pushing and pulling forces. Two ranges allow you to measure forces from 0.01 newtons to 50 newtons. It can be used in a broad range of ways: as a replacement for a hand-held spring scale; mounted horizontally on a dynamics cart to study collisions; mounted on a ring-stand to measure forces in a vertical direction; collect data from two Force Sensors simultaneously to study Newton's Third Law.

Quantity Available: 10



Gas Pressure Sensor

The Gas Pressure Sensor can be used to monitor pressure changes in a gas. The range is wide enough to perform Boyle's law yet it is sensitive enough to conduct vapor-pressure or pressure-temperature experiments. Biology teachers can use the Gas Pressure Sensor to monitor transpiration or respiration in an enclosed environment.

Quantity Available: 10



Hand-Grip Heart Rate Monitor

The Hand-Grip Heart Rate Monitor is ideal for continuously monitoring heart rate before, during, and after exercise or while a person is stationary. Hand grips do not require electrodes or clips. Easy to clean and share between students.

Quantity Available: 10



Light Sensor

The Light Sensor approximates the human eye in spectral response. Use it for inverse square law experiments or for studying polarizers, reflectivity, or solar energy.

Quantity Available: 10



Low-G Accelerometer

The Low-g Accelerometer is the best choice for most acceleration experiments, including Newton's second law, simple harmonic motion, and the relationship between acceleration and force. It can also be used to study one-dimensional motion of a car (real and toy), an elevator, a pendulum bob, or an amusement park ride.

Quantity Available: 10



Magnetic Field Sensor

This sensor uses a Hall effect transducer, and measures a vector component of the magnetic field near the sensor tip. It has two ranges, allowing for measurement of relatively strong magnetic fields around permanent magnets and electromagnets, as well as measurement of weak fields such as the Earth's magnetic field. The articulated sensor tip allows you to measure both transverse and longitudinal magnetic fields.

Quantity Available: 10



Microphone

Collect data with the Microphone to display and study the waveforms of sounds from voices and musical instruments. It also works well for speed of sound experiments.

Quantity Available: 10



Motion Detector

The Motion Detector uses ultrasound to measure the position of carts, balls, people, and other objects. Measure objects as close as 15 cm and as far away as 6 m. Sensitivity switch reduces noise and produces higher quality data for studying dynamics carts on tracks. Pivoting head allows for flexibility in the experiment setup.



pH Sensor

Use the pH Sensor just as you would a traditional pH meter with the additional advantages of automated data collection, graphing, and data analysis. Typical activities using our pH sensor include: acid-base titrations; studies of household acids and bases; monitoring pH change during chemical reactions or in an aquarium as a result of photosynthesis; investigations of acid rain and buffering; analysis of water quality in streams and lakes.

Quantity Available: 10



Stainless Steel Temperature Probe

The Stainless Steel Temperature Probe is a rugged, general-purpose temperature sensor that can be used in organic liquids, salt solutions, acids, and bases. Use it as you would use a thermometer for experiments in chemistry, physics, biology, Earth science, and environmental science.

Quantity Available: 10



Voltage Probe

The Voltage Probe is a bipolar sensor used to measure direct voltage. The black lead is grounded along with the interface, and the sensor reports the potential difference between the red lead and ground. It can be used to measure the potential in DC or AC circuits.

Quantity Available: 10

Lab Books: Curriculum for the LabQuest2 & Sensors

All Vernier Lab Books feature the following:

- Complete student experiments with materials list, step-by-step instructions, data tables, and questions.
- Teacher Information section for each experiment with complete directions for setting up experiments, helpful hints, and sample graphs and data.
- Word-processing files of the student sections on a CD so that any experiment may be easily edited to your specifications (Microsoft Word for Macintosh and Windows files).
- Experiments that directly correlate to state standards.
- Lab activities are matched to the tables of contents in dozens of popular textbooks.

Please note that you will NOT be allowed to check out the actual books. You may browse through them and make copies, here at our office, of the lessons you want. If you want to use any of the files on the accompanying CD, please bring a USB drive and we will copy the digital files onto the USB drive for you.

Advanced Biology with Vernier contains 17 ready-to-use labs including all 12 recommended AP* Biology labs with complete instructions for data collection. The first 12 experiments have a direct 1-to-1 correlation with the 12 labs in the AP Biology Lab Manual.

Advanced Chemistry with Vernier has 35 advanced chemistry experiments designed. The first 22 experiments have a 1-to-1 correlation with the 22 experiments recommended by AP* for AP Chemistry courses. There are four student alternative versions included for each experiment: computer, calculator, and a generic version that covers all platforms. Experiments are included for the Vernier Temperature Probe, pH Sensor, Conductivity Probe, Drop Counter, Colorimeter, Gas Pressure Sensor, Current Probe, ORP Sensor, and Radiation Monitor.

Advanced Physics with Vernier—Mechanics is the first of a two volume set and has experiments for the more in-depth introductory physics course. Experiments are designed for an interactive teaching style, with planned moments for instructor or student-led discussion. Instructor notes include discussion on how to lead students to a successful activity. The book includes many extensions to challenge the most talented students.

Advanced Physics with Vernier—Beyond Mechanics is the second of two volume set (see above) and is recommended for college physics, AP or IB Physics.

Agricultural Science with Vernier contains a collection of 29 experiments that can be useful in teaching agricultural science at the high school or college level. Some experiments are designed to be done in the field, and some in the classroom or laboratory. Topics include: Fundamentals of Agricultural Science, Plant and Soil Science, Animal Science, Energy and Electricity, General Topics in Agricultural Science.

Biology with Vernier has 31 experiments in cell respiration, photosynthesis, membrane diffusion, osmosis, human physiology, transpiration, fermentation, and other important biology concepts. The complete table of contents is shown below. Experiments are included for 12 Vernier biology sensors. This book supports seven AP* Biology lab activities.

Chemistry with Vernier has more than 36 experiments in thermochemistry, gas laws, acid-base reactions, equilibrium, electrochemistry, electrolytes, states of matter, and more. Experiments are included for the Gas Pressure Sensor, Temperature Probe, pH Sensor, Conductivity Probe, Colorimeter, and Voltage Probe.

Earth Science with Vernier contains 33 experiments and 6 projects covering topics in Geology, Soil Analysis, Water Quality, Hydrology, Meteorology and Energy.

Elementary Science with Vernier has activities that investigate the topics of temperature, motion, force, magnetism, light, electricity, and pressure. Also included are lots of teacher tips, black-line masters, and clear illustrations to facilitate student understanding.

Forensics with Vernier Containing lab activities dealing with various aspects of forensic science, each lab is preceded by a short scenario that introduces the concepts or methods to be addressed in the lab. These introductory sequences are designed to “hook” the students and show them situations that require various forensic techniques. The Case Analysis questions for each activity relate to the concepts and techniques addressed in the lab, and many require the students to “solve” the crime introduced in the scenario with the data they collect.

Human Physiology with Vernier has experiments designed to encourage students to think about the physiology of various human organ systems by measuring the activity of the upper respiratory tract, the lungs, the heart, the nervous system, and the musculoskeletal system. Homeostasis is an underlying theme, and several experiments illustrate the response of the human body to stress or external influences.

Lets Go Investigating Temperature Aimed especially for elementary teachers, this lab book contains ten engaging temperature experiments. Included in this book are activities for grade 2 through 5, easy-to-use, black-line masters, lots of teacher tips and clear illustrations to facilitate understanding. Let's Go! Investigating Temperature is aligned with National Science Standards and Benchmarks.

Middle School Science with Vernier was written specifically for students in grades 6-8. It contains 38 experiments in Earth science, life science, and physical science, making use of ten different Vernier middle school sensors. Your students will really enjoy doing these well-written and well-tested science experiments!

Organic Chemistry with Vernier makes it easy for organic chemistry instructors to integrate Vernier data-collection technology into the organic chemistry lab curriculum. The experiments involve characterization of reactions and compounds using the Vernier Melt Station, Mini Gas Chromatograph, SpectroVis Plus, and the Polarimeter.

Physical Science with Vernier contains 40 ready-to-use experiments for physical science (middle school through grade 10). Experiments are included for 9 Vernier physical science sensors in chemistry and physics. These experiments are perfect for introductory physical science and integrated science classes!

Physics with Vernier has 35 experiments in mechanics, sound, light, electricity, and magnetism. This book has a wide variety of experiments for Motion Detectors, Force Sensors, Light Sensors, Magnetic Field Sensors, Microphones, Current & Voltage Probes, Photogates, Temperature Probes, and Accelerometers.

Real World Math with Vernier includes 32 activities covering concepts such as linear, quadratic, and periodic functions, statistics, systems of equations, and many more. The activities found in the printed book are written for use with TI-Nspire™ technology. The book includes a CD with editable Word files for all the activities in the book. The CD also contains versions of the activities for EasyData, DataMate, and Logger Pro.

Water Quality with Vernier has 16 water quality tests, including pH, total dissolved solids, dissolved oxygen, BOD, flow rate, turbidity, nitrates, and phosphates. All nine tests in the Water Quality Index (WQI) are supported. A comprehensive introduction is included for each test, providing important background information for the students.

Ciencias con lo Mejor de Vernier includes 42 experiments from 5 subject areas (Biology, Chemistry, Physics, Earth Science and Water Quality) for Spanish-speaking science education in both middle and high school.

Ciencia en la Primaria con Vernier includes 43 ready-to-use activities for Spanish-speaking elementary science education. Activities investigate the topics of temperature, motion, force, magnetism, light, electricity, and pressure. Also included are lots of teacher tips, black-line masters, and clear illustrations to facilitate student understanding.

Den of Inquiry Volume 1 is a collection of 15 labs for introductory physics. These labs pay special attention to data analysis and mathematical modeling, but they do not use any sensors. Students enter the data directly into a computer or handheld; the book includes files and instructions for Logger Pro and for Fathom Dynamic Data Software™. Each lab includes extensive teacher notes and blackline masters for the students' predictions, instructions for the lab and for data analysis, and follow-up questions. Many labs also include pre-lab activities, extensions to the labs themselves, and strategies for making the labs more open-ended.

Den of Inquiry Volume 2 is a collection of 16 sensor-based activities for introductory physics. Topics include kinematics, mechanics and energy; activities emphasize data analysis and modeling. Either Fathom 2.1 or Logger Pro software can be used. Each lab includes blackline masters for student handouts and extensive teacher notes, including extensions and options for making the activities more open-ended.



iPad Mini

16 GB, Wi-Fi

Quantity Available: 10



Digital Multimeter

Auto/manual ranging digital multimeter. Measures AC/DC Voltage, AC/DC Current, Resistance, Capacitance, Frequency and Duty Cycle. Also performs Diode Test and Continuity Check. Uses 3 AAA batteries.

Quantity Available: 10



Garmin eTrex 20 Handheld GPS

High-sensitivity, WAAS-enabled GPS receiver quickly acquires satellite locations. Features a 2.2" 65K color display with 176x220-pixel resolution. Pre-loaded worldwide basemap supports Garmin custom maps and BirdsEye™ satellite imagery. Add optional mapping software via the micro-SD card slot. Connect to your computer with the USB interface. Powered by two AA batteries for up to 20 hours.

Quantity Available: 10



Stereo Microscope with USB Digital Camera

- 10X, 20X, 30X, 60X magnification
- Top or bottom lighting
- High resolution and broad field of view
- Clear stereo images
- 45 degree inclined binocular viewer
- USB Camera for PC display

Quantity Available: 6



Switchable UV Lamp 254/365

Small, lightweight lamp ideal for use anywhere. Applications for use include forensic experiments, oil/leak detection, gem and mineral inspection, and sterilization. Uses 4 AA batteries.

Watts: 4

Wavelength: 254/365 nm

Intensity: 113/68 $\mu\text{W}/\text{cm}^2$

Quantity Available: 10

pH Meter

Compact, easy to use meter with these features:

- Used in laboratory and industrial application
- Manual one-point calibration
- Single-line LED screen for easy viewing



Quantity Available: 10

Mini Blacklight

Six inch portable, lightweight fluorescent blacklight. Applications for use include forensic experiments, oil/leak detection, gem and mineral inspection, forgery detection and much more. Uses 4 AA batteries. Also doubles as a flashlight.

Watts: 4

Wavelength: 365 nm

Quantity Available: 10



50 Piece Magnet Set

This useful magnet set contains 50 magnets of various sizes and shapes, such as ceramic ring, disks, bars rectangular ring and alnico cylindrical magnets. Great for sciences projects of all shapes and sizes!

Quantity Available: 23 sets

Guiding Student Research: Making Research Happen in Your School

Published by the National Consortium for Specialized Secondary Schools of Mathematics and consistent with the National Science Education Standards, this "how to" guide will get you started on practical hands-on student research in high school. This book is a must read for STEM educators who want to ensure that students actually do research not just learn about it.

Copies Available: 5

