

Proposal for the Interdisciplinary Innovations Fund

June 13th, 2008

Using Service Learning to Teach Sustainable Agriculture in downtown Columbia

This direct action interdisciplinary project will investigate sustainability on many levels. Students will improve urban agriculture infrastructure, examine the use of bike trailers, and compost food scrap “waste” from Rollins Dining. Students will design and implement a three-year garden experiment that tests different soil treatments and crop rotations. Data will be collected with hand held computer devices.

Endorsements

Signature

Date

Sustain Mizzou, Adam Saunders, (grant writer)

Sustain Mizzou, Pat Margherio

Environmental Studies, Dr. Jan Weaver

Rollins Dining Services, Nancy Monteer

Plant Sciences, Dr. Chris Starbuck

Community Garden Coalition, Bill McKelvey

Goals and Objectives

This grant aims to provide the infrastructure and teaching tools necessary for the non-profit student group Sustain Mizzou to teach a service learning class about sustainable urban agriculture. These tools will empower students to engage in various hands-on learning opportunities, compost food scrap “waste” generated by Rollins Dining, and build composting systems at area community gardens. Students will learn about experimental design by making and implementing a three-year crop rotation experiment. Student will use the handheld computers to record data collected during the experiment. Students will use the data to write a report detailing their project findings and to make presentations about the project in general.

Description

There are five main components to this proposal: Service-learning taught by Sustain Mizzou, diverting Rollins food scraps from the landfill to a composting system, demonstrating the efficacy of bike powered trailers, addressing the long term soil sustainability of the Columbia community gardens, and using handheld computers to collect data.

1. Sustain Mizzou and Environmental Studies will teach a hands-on service learning class that examines sustainability issues related to urban food production and soil fertility. Students of this class will tend, harvest, and plant a bio-intensive organic garden at the Sustain Mizzou Community Garden just north of downtown Columbia. The students will plan out the next three years of crop rotation for this garden. Students will build composting bins in as many as 17 local community gardens and fill them with collected composting material from Rollins Dining and Stephen’s Equine Stables. Students will collect and analyze data from the raw compost material and the mixture as it decomposes. Students will write a report outlining this experimental waste handling system and make recommendations to the University on future waste system investments. Class time will be filled with projects related to garden cultivation and compost management as well as featuring many guest lectures. These lectures will engage in discussion of various aspects of sustainable food production. A proposed class schedule is included in the attachments.
2. Currently Rollins is the only dining hall that is equipped with a food waste pulper. A pulper grinds up raw food scraps and removes a large amount of the water yielding a compost ready material that resembles tuna salad. This material goes un-utilized and is sent to the landfill. One key goal of this project is to show that the additional investment of installing a food scrap pulper is justified when the food scraps are collected and properly composted. The Rollins pulper has been in operation for 10 years, however only small amounts of the food waste has been composted through exploratory settings. Composting all of the food scraps would reduce the amount of trash generated by the Rollins Dining by approximately 2500 pounds per week. This reduction of waste will in turn yield a cost savings for Rollins Dining.
3. Bike trailers will be used to collect and haul the composting feedstock. This will demonstrate that bike power is a legitimate option in urban entrepreneurship

- because it avoids the large expense of transportation fuel. GPS devices will be attached to each bike to record the distance and time it takes to move this material from its source to each garden. We will use this data to estimate how much fuel use was avoided and how much the overhead cost of was reduced.
4. There are currently 17 community gardens in the city of Columbia. Based on the observations of this author, the greatest threat to the long-term viability of these gardens is the lack of soil sustainability: most notable is the inadequate addition of compost. Without adding compost to the soil, the fertility will steadily reduce to a point where crop growth will suffer. One key solution to this problem is building large composting bins made of reused wooden pallets. These bins have been tested and can support a healthy compost pile while keeping out small animals. Student will fill these bins with composting feedstock and maintain them so that high quality soil building compost is produced. This material will ultimately be made available to the community gardens. The compost made in the fall of 2008 should be ready to add to the soil in the spring of 2009.
 5. Information technology will play an important role in data collection during this project. Students will use handheld computers (PDAs) to record the following data: weight of compost feed stock additions, compost pile temperatures, weight of harvested vegetables, and other observational and experimental design notes. These computers will also be used to help implement a planting design and ensure that the students accurately set up the experiments. GPS devices will be affixed to all of the bike trailers. These devices will collect information on distance traveled and the time it takes to get from one stop to the next. Data collected with these two devices will be used to run statistical analysis and produce aerial maps of the delivery routes and community gardens.

Management Plan

Time to complete project including report

Data will be collected throughout the semester. Food scrap pick-up and delivery will begin during the second week of the semester and will continue five days per week for ten weeks. At this time the data will be compiled and analyzed. This information will be used in the construction of a project report that will be turned in on Friday of finals week December 12th, 2008.

Personnel and their responsibilities

There are several individuals involved with this project.

Adam Saunders is the grant writer and service-learning class facilitator. He will arrange for guest speakers, oversee the collection of food scraps, organize the construction the compost bins, maintain compliance with the grant funds, and perform other duties as needed. The value of Adam's in kind voluntary teaching services are estimated at \$1000.00 dollars for the entire semester.

Bobby Johnson will be a teaching assistant for the class. He will help Adam organize and instruct the class. The value of Bobby's in kind voluntary teaching services are estimated at \$1000.00 dollars for the entire semester.

Dr. Jan Weaver is the faculty sponsor for the service-learning class. She will help the students complete the final report, oversee the project and advise Adam and the class students. The value of Jan's in kind voluntary teaching services are estimated at \$2250.00 dollars for the entire semester.

Dr. Chris Starbuck is the second faculty advisor to the project. He will provide insight into how to manage the compost and help plan out the garden design. The value of Chris' in kind voluntary teaching services are estimated at \$2250.00 dollars for the entire semester.

Service-learning students will attend classes, build compost bins at each garden, haul food scraps and manure, cultivate crops at the Sustain Mizzou Community Garden, and write a final report. The class will be limited to 15 students.

Project phases, milestones, interim deadlines

The first phase of this project involves building composting bins and filling them with material. The volume of the compost will be sampled in order to estimate how many composting bins will be needed to handle the 10 weeks of additional feedstock. If all the bin capacity is filled prior to the ten-week goal, the food scrap collection will be discontinued.

The second phase, which will overlap with the first phase, is the cultivation of the Sustain Mizzou Community Garden. The students will harvest fall crops and plant fall beds. Some of these new beds will be harvested that fall while others will over winter and be harvested the next spring.

The third phase is the report-writing phase. This phase will begin mid semester and overlap with the first two phases. When the compost collection and gardening phases end due to the cold weather, the third phase will become the primary focus of the project. Students will write a report on the efficacy of the project and make recommendations to Campus Dining Services.

Evaluation Criteria

There are several metrics from which this project will be evaluated. One is the total number of bins constructed and amount of finished compost made. A second is the total amount of food waste diverted from the landfill. A third is the successful design and implementation of a three-year crop rotation study at the Sustain Mizzou Community Garden. A fourth is the completion of a quality final report written by the students. This fourth point will thoroughly discuss the status of the three criteria mentioned above.

Proposed Budget

Bike Trailers and accessories

Model 96A Bike Trailer	\$520.00
Model 64A Bike Trailer	\$460.00
Bike Trailer Hitch	\$ 50.00
Lumber to convert trailer to haul manure	<u>\$100.00</u>
	\$1130.00 total

Used Bikes

Small rebuilt mountain bike from Klunk	\$300.00
Large rebuilt mountain bike from Klunk	<u>\$300.00</u>
	\$600.00 total

Bike Safety Accessories

2 Safety helmets (36.99 dollars each)	\$ 73.98
2 Safety Light set for bikes (32.99 dollars each)	\$ 65.98
2 Safety Light set trailer (16.99 dollars each)	\$ 33.98
Tire Pump	\$29.99
2 Bike U-Lock (34.95 dollars each)	\$69.90
2 Bike Lock, 7-foot chain (10.99 dollars each)	<u>\$ 21.98</u>
	\$295.81 total

Composting and Gardening Equipment

100 Reused pallets (1 dollar each)	\$100.00
25 t-posts to secure bins (7.73 dollars each)	\$193.25
5 Compost forks (25.97 dollars each)	\$129.85
5 garden forks (25.97 dollars each)	\$129.85
5 garden shovels (16.96 dollars each)	\$ 84.80
3 wheel barrows (57.99 dollars each)	\$173.97
Miscellaneous expenses	<u>\$500.00</u>
	\$1311.72 total

Information Technology Devices

Handheld PDA	\$199.99
GPS Device	\$99.95
Digital scale to weigh compost	\$285.00
Temperature probe for compost	<u>\$ 96.90</u>
	\$681.84 total

\$4019.37 Grand Total*

*Note that this does not include shipping of items bought on the internet

Sustain Mizzou will use equipment purchased with this grant to participate in gardening and composting projects for many years to come. Sustain Mizzou will also use the bike trailers for other projects such as Tiger Tailgate Recycling, the Local Food Drive, stream cleanups, and Bike Fest events.

Pedagogical and Technical Support Staff

Technical Support staff would greatly benefit this project by setting up a database where all the data collected by the students could be transmitted, compiled and stored.

Endorsements

Signature

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Sustain Mizzou, Adam Saunders, (grant writer)

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Bike Trailers and Accessories

Model 96A Bike Trailer \$520.00. www.bikesatwork.com



Description

Our model 96A bike trailer is the largest of our [channel-frame bike trailers](#). It is designed to carry six waterproof 18 gallon (68 liter) Rubbermaid Roughtote plastic containers (sold separately, but also available locally), each of which can carry two large paper bags of groceries. In addition to groceries, these trailers are useful for carrying things like recyclables, newspapers, ladders, and furniture.

You can also make the trailer into a flatbed by mounting a piece of 1/4" (6 mm) plywood on the frame.

This trailer can carry loads up to 300 lbs (136 kg). It is made of rustproof aluminum with a heavy-duty galvanized steel axle.

Features

- 300lb (136 kg) cargo capacity
- Carry groceries, recyclables, furniture, lumber, ladders, etc.
- Convertible into a model 64A or 32A by removing one or two sections.

Specifications

- cargo area: 96" x 19.25" (244 cm x 49 cm)
- overall dimensions: 121" x 28.75" (307 cm x 73 cm)
- width between fenders: 23.25" (59 cm)
- ground clearance: 7.5" (19 cm)
- maximum length of cargo: 15' (4.57 m)
- weight: 43 lbs (20 kg) (approx.)
- each trailer comes with:
 - 1 trailer hitch
 - 6 shock cords
- package dimensions: 6x16x33 inches (16x41x84 cm)

Bike Trailers and Accessories, continued

Model 64A Bike Trailer, \$460.00 www.bikesatwork.com



Description

Our model 64A bike trailer is the mid-sized model of our [channel-frame bike trailers](#). It is designed to carry four waterproof 18 gallon (68 liter) Rubbermaid Roughtote plastic containers (sold separately, but also available locally), each of which can carry two large paper bags of groceries. In addition to groceries, these containers are useful for carrying things like recyclables, newspapers, books, and garden mulch.

You can also carry longer items like lumber, furniture, and rugs or make the trailer into a flatbed by mounting a piece of 1/4" (6 mm) plywood on the frame.

This trailer can carry loads up to 300 lbs (136 kg). It is made of rustproof aluminum with a heavy-duty galvanized steel axle. By removing a couple frame sections you can convert the Model 64A into a Model 32A. Or by purchasing an add-on kit, you can convert the Model 64A trailer into a Model 96A.

Features

- 300lb (136 kg) cargo capacity
- Carries groceries, newspapers, lumber, furniture, etc.
- Can be shortened by removing a pair of frame segments
- Can be lengthened by ordering an trailer frame add-on kit

Specifications

- cargo area: 64" x 19.25" (162 cm x 49 cm)
- overall dimensions: 89" x 28.75" (226 cm x 73 cm)
- width between fenders: 23.25" (59 cm)
- ground clearance: 7.5" (19 cm)
- maximum length of cargo: 108" (2.44 m)
- weight: 35 lbs (16 kg) (approx.)
- each trailer comes with:
 - 1 trailer hitch
 - 4 shock cords
- package dimensions: 6x16x33 inches (16x41x84 cm)

Bike Trailers and Accessories, continued

Bike Trailer Hitch, \$50.00 www.bikesatwork.com



Description

Easily capable of pulling 500 lbs (235 kgs) or more, our bicycle trailer hitch is perhaps the most rugged and durable hitch available. It mounts to almost any standard bicycle frame, even bikes with a rear suspension system or disc or drum brakes. The entire hitch--even the mounting clamps--is made of stainless steel to prevent rusting, cracking, or breaking. Our new design spreads out the load, and plastic protectors that slip over the frame tubes prevent damage to your frame or marring of your frame's finish. Both the plastic protectors and mounting clamps can be easily and inexpensively replaced using materials from your local hardware store.

Note: One hitch is included in the price of every trailer. If you are ordering a trailer and do not need more than one, do not order one separately.

Features

- three-point mounting system mounts hitch securely
- all stainless-steel construction
- mounts to any bicycle frame, including bikes with disc brakes or rear suspension
- easily-replaceable mounting hardware

Specifications

- package includes:
 - 1 stainless steel hitch
 - 3 stainless steel band clamps
 - 2 tubing protectors
- weight: .5 lbs / .23 kg (approx.)

Bike Safety Accessories

Helmet



SPECIALIZED AIR FORCE 3, \$36.99

cyclex.com Cycleextreme, Columbia, MO

If you're serious about protection and want a stylish lid that won't weigh you down, Specialized's Air Force 3 is for you! In addition to the stylish, racy finish, it fits and feels great and sports large vents to keep you cool. It also features an easy-to-use fit system and has In-mold construction for durability and a visor to help keep the sun, dirt and rain out of your eyes.

Safety Lights



BLACKBURN QUADRANT/MARS 3 COMBO \$32.99

cyclex.com Cycleextreme, Columbia, MO

Blackburn's Quadrant/Mars 3 Combo is the perfect way to upgrade your bike for night riding. The Quadrant headlight features 4 super-bright LEDs for tons of light. Plus, the optically boosted center LEDs provide ample illumination in front, and the wide-angle side LEDs deliver 180-degrees of visibility. So, you'll see the road and drivers will see you, too. For the rear, Blackburn's Mars 3.0 taillight boasts 7 brilliant red LEDs and excellent rear and side visibility, too.

Bike Safety Accessories

Safety lights



BLACKBURN MARS 3.0 TAILLIGHT \$16.99

cyclex.com Cycleextreme, Columbia, MO

Blackburn's Mars 3.0 has 7 ultra-bright red LEDs and flashing and steady modes to keep you super visible. Plus, Blackburn's high-tech lens and the side LEDs ensure 180 degrees of safety-boosting visibility. This great taillight also easily attaches to your bike, rack or pack with the included mounts. It's light, durable and water resistant, too.

Tire Pump



Blackburn Air Tower 2, \$29.99

cyclex.com Cycleextreme, Columbia, MO

The Air Tower 2 boasts Blackburn's tough steel barrel for easy pumping every time. It also features a comfortable T-handle with storage, a long hose and a double-barrel thumbblock head that fits all valves. Plus, the large gauge makes it easy to get the pressure just right.

Bike Safety Accessories

Bike Lock



KRYPTONITE KRYPTOLOK SERIES 2 ATB \$34.95

cyclex.com Cycleextreme, Columbia, MO

The KryptoLok Series 2 ATB is a U-lock ideal for moderate risk areas. It has a 13mm-diameter Performance steel shackle that resists cutting and leverage attacks. Plus, the enhanced internal engineering, high-security disc-style cylinder and a patented deadbolt locking mechanism add protection. A reinforced steel shield over the crossbar and cylinder provides enhanced security protection, too. The extra width makes this the standard for mountain bike security. The anti-theft protection offer has been increased by \$250 (\$1,500) because of the new changes. This great lock features Kryptonite's new "I" key, too.

Bike lock for trailer



CANNONDALE FOLSOM 7 CABLE, \$10.99

cyclex.com Cycleextreme, Columbia, MO

Cannondale's Folsom 7 cable means tough security for your bike. This 7-foot braided steel cable is 10mm thick, double-looped and boasts a durable vinyl cover to protect your equipment. Its long length makes it perfect for use with a padlock or U-lock to secure your frame and wheels or multiple bikes.

Composting and Gardening Equipment

T-posts



Post Studded T Grn/ Gry 6'
Studded T-Post

- * 1.25 lb/ft
- * Rail steel
- * Green enamel, light gray tip
- * Clips not included
- * 6'

\$38.65 for 5 t-posts

or

\$7.73 each

Composting and Gardening Equipment

Compost Fork



GT Compost Fork

Price: \$25.97

Product Description

Green Thumb, Classic Plus, Compost Fork, 5 Tines, 10" Forged Steel Head, 29" D Grip Handle, Power Collar, 10 Year Warranty, Replacement Handle Sequatchie Link #730-29, True Value #102-160,

Product Details

- * Product Dimensions: 48 x 4.9 x 6 inches ; 5 pounds
- * Shipping Weight: 5 pounds (View shipping rates and policies)

<http://www.amazon.com/dp/B000A11EHC?smid=AEWYNDAJ4QAA9&tag=nex-tag-tools-tier4-20&linkCode=asn>

Composting and Gardening Equipment

Garden Fork



GT DH Digging Fork

Price: \$25.97

Product Description

Green Thumb, Master Series, 28" D Handle Steel & Wood Digging Fork, Heat Treated Forged Steel Head, Diamond Back Tines, Capped Long Bent Ferrule, 9-7/8" Tines With 1-1/2" Space Between, Lifetime Warranty, Replacement Handle, Sequatchie #730-29, True Value #102-160.

Product Details

* Product Dimensions: 6.3 x 2.6 x 1.3 inches ; 3.5 pounds

* Shipping Weight: 3.5 pounds (View shipping rates and policies)

<http://www.amazon.com/dp/B0000BYBPY?smid=AEWYNDAJ4QAA9&tag=nex tag-tools-tier4-20&linkCode=asn>

Composting and Gardening Equipment

Garden Shovel



GT DHSP Scooping Shovel

Price: \$16.96

Product Description

Green Thumb, Classic D Handle, Steel & Wood, Square Point Shovel, 9-7/16" x 11-1/8" Tempered Steel Blade, 29" Super D Handle, Power Steps, Reinforcing Steel Power Collar, 10 Year Warranty, Replacement Handle, Sequatchie #829-29, True Value #108-548.

Product Details

- * Product Dimensions: 1.2 x 1.5 x 6.7 inches ; 2 pounds
- * Shipping Weight: 2 pounds (View shipping rates and policies)
- * ASIN: B0000BYBQ4

<http://www.amazon.com/dp/B0000BYBQ4?smid=A9HNR4I8RXLVW&tag=next-ag-tools-tier4-20&linkCode=asn>

Composting and Gardening Equipment

Wheelbarrow



True Temper® Landscaper Wheelbarrow (C6)

Price: \$57.99

- * 6 cu.ft. capacity
 - * Heavy duty seamless steel tray
 - * Front tray braces
 - * Heavy "H" braces on legs
 - * 16"x 4", 2-ply pneumatic tire
 - * Oil lube bearing on wheel
 - * Hardwood handles
 - * Replacement handles Ace no. 74647 or 70655
 - * Replacement wheel Ace no. 70005
 - * Optional tool tray - Ace no. 7173479
 - * Black tray

Miscellaneous expenses \$500.00

Items that would likely need to be purchased under the miscellaneous expenses funding include but are not limited to: lime to reduce compost smell, vegetable seeds or starts, hardware to construct composting bins, material to construct a storage shed for our gardening tools, markers for different experimental treatment areas, soil additive “char”, and other unexpected expenses that arise.

Information Technology Devices

Tungsten E2 Handheld



Stay productive in the office, at your favorite hotspot or at home with the palmOne™ Tungsten™ E2 Handheld. Connect the handheld to compatible wireless devices, such as mobile phones, laptops, and printers with ... Full Description

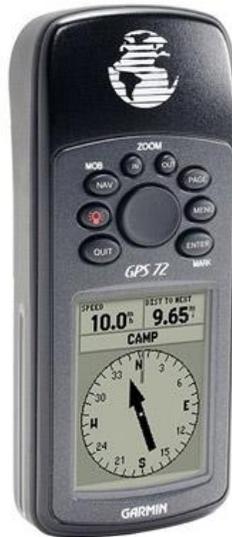
Starting Price \$199.99

- * Features the Intel® 200 MHz XScale processor
- * Creates and edits Word, Excel and PowerPoint compatible files using built-in software
- * Allows you to wirelessly access email, dial phone numbers, send text messages and connect to the Internet using a compatible Bluetooth® mobile phone
- * Drags and drops files and folders easily from your desktop to your handheld
- * Built-in expansion card slot lets you plug in eBooks, games, a language translator and more
- * Enables you to carry digital photo albums of friends and family, students and co-workers, even the current real estate listings

http://accessories.us.dell.com/sna/products/Palm_PDAs/productdetail.aspx?c=us&l=en&s=dhs&cs=19&sku=A0474224

Information Technology Devices

Handheld GPS device



Garmin GPS 72 Handheld GPS

Includes: wrist strap, owners manual, quick reference guide.

SKU#: GA00309 | MAN#: 010-00309-00 | ID#: 397

Price: \$99.95

Garmin GPS 72 Handheld GPS Detail

A low cost, rugged, WAAS GPS

Hiking GPS Bicycle GPS Boating GPS WAAS Capable

The Garmin GPS 72 features a 12 Channel WAAS GPS receiver which updates position, course and speed once per second and provides up to 10 foot accuracy when receiving the WAAS signal*.

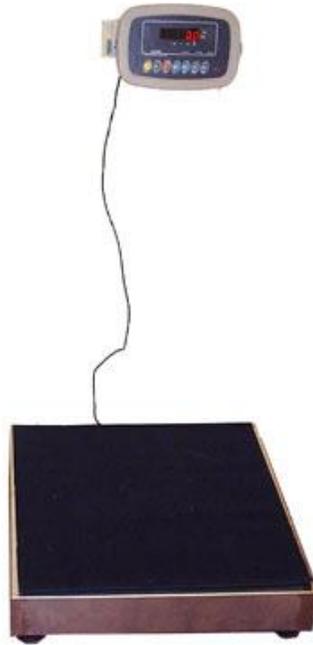
Waterproof The GPS 72 is rugged and waterproof too, and the high contrast LCD display and keypad are both backlit for nighttime operation. The track plotter page shows your position relative to other waypoints and also displays your track. The compass pointer page clearly shows which direction you're moving and which way to your destination. You can enter up to 500 waypoints with a name and symbol for easy recall later and make up to 50 routes. The built-in points database includes marine Nav-aids for North and South America, US tide stations, and worldwide cities. It can even be updated with different data from Garmin's optional Mapsource "points of interest" CD-ROM.

The Garmin GPS 72 also features a detailed trip computer providing and odometer, stopped time, moving time, overall average, total time, max speed and more. Other features include permanent user data storage, audible and visual alarms, sunrise/sunset and celestial tables, and automatic track log with 10 saved tracks. 1 year warranty. Size: 6.2"H x 2.7"W x 1.2"D. Weight 7.7 oz.

*The WAAS signal is currently available in the US only in open areas or on the water. Standard GPS accuracy is 50 feet

Information Technology Devices

Scale to weigh composting feedstock inputs and harvested vegetables.



14" x 18" Bench Floor Scale (66lbs - 770lbs)
by Masterline

Large base with multiple capacities.
Perfect for custom applications of any kind
Integrated wireless

Digital bench scale utilizes a highly accurate load cell makes this the ideal scale for all of your custom needs. The scale can weigh up to 770lbs (weighs in KG also-standard). The 14" x 18" stainless steel weighing platform provides you with a durable, heavy-duty surface. Easy plug and play is easy to use. The custom indicator (wired) features a 0.8" high LED display with AC adapter. This industrial bench scale can be used for general warehouse weighing, industrial parts or components, drums, engines, transmissions, furniture, crates, boxes, packages, and just about everything else.

Ships to you pre-calibrated and tested so you're ready to take it out of the box to begin weighing
Weighing Units

lbs and kilograms (standard)

Capacity

30kg x .01kg / 66lb x .02lb - \$285.00
60kg x .01kg / 120lb x .02lb - \$285.00
100kg x .02kg / 220lb x .05lb - \$285.00
150kg x .02kg / 330lb x .05lb - \$285.00
200kg x .05kg / 440lb x .1lb - \$285.00
250kg x .05kg / 550lb x .1lb - \$290.00
300kg x .1kg / 660lb x .2lb - \$315.00
350kg x 0.1kg / 770lb x .2lb - \$315.00

Power

AC Adaptor standard or optional
rechargeable battery (\$75.00)

Warranty

1 Year Warranty

Indicator Dimensions

9.5" x 6.5" x 4"

Base Dimensions

18" x 14" x 4"

<http://www.onedigitalscales.com/scales.cfm//scales/IndustrialScales/14x18BenchFloorScale66lbs770lbs/>

Information Technology Devices

Compost Thermometers



The REOTEMP Compost Thermometers are ideally suited for monitoring interior temperatures of compost piles and windrows. The clear, easy-to-read dial, with the pointer directly driven by the sensitive bi-metal helix in the bottom of the stem, gives an accurate reading every time. Used by composters everywhere for waste disposal, recycling, mushroom growing, etc.

Heat is an essential element in the production of good compost. The temperature reading tells you when to add water, turn the pile and when it is ready to use. If the compost is too hot, it can kill microorganisms that are essential to proper conversion of compost materials to humus. If the compost temperature is too cold microbial activity is reduced, weed seeds and disease pathogens are not destroyed, and your compost can take a very long time to mature.

Dual Scale REOTemp The REOTemp Backyard Composting Thermometer with 1/4" stem is specially designed with the home composter in mind. The REOTemp Backyard Thermometer comes with a temperature range of 0°F to 200°F, a 20" long stainless steel stem with a pointed tip for easy insertion and an easy-to-read 2" diameter dial.

The REOTemp Dual Scale Bimetal Compost Thermometers with heavy duty 5/16" hardened steel shaft are specifically designed to monitor the temperatures of windrows and static compost piles. The clear, easy to read, 3" unbreakable plastic crystal dial gives an accurate reading every time. Dual Scale thermometers display both the Farenheit scale and Celsius scale from -10°C to 90°C. The REO Temp thermometers come with a detachable PVC sheath to protect the probe during storage.

- # Rugged all stainless construction
- # Hermetically sealed-will not fog

- # Unbreakable plastic crystal
- # Pointed stem for easy insertion
- # Easy-to-read 3" diameter dial
- # Very accurate (+1% of scale)
- # Heavy Duty 5/16" diameter stem available

These thermometers are used everywhere for composting, waste disposal, recycling, mushroom growing and soil testing.

404101 Compost Thermometer, 20", 1/4 dia (F only) (.5#)	\$27.50
404201 Compost Thermometer, 24", 1/4 dia (1#)	\$70.90
404211 Compost Thermometer, 24", 5/16 dia (2#)	\$79.90
404411 Windrow Thermometer, 36", 5/16 dia, (F & C) (3#)	\$96.90
404601 Windrow Thermometer, 48", 5/16 dia, (F & C) (30#)	\$160.00
404701 Windrow Thermometer, 60", 5/16 dia, (F & C) (30#)	\$189.00
404801 Windrow Thermometer, 72", 5/16 dia, (F & C) (70#)	\$260.00

Proposed Class Schedule

	Topic	Guest Speaker	Deliverable	Field work
Week 1	orientation to pick up, transport and delivery of compost; use of hand held devices for data collection	Dr. Jan Weaver, course sponsor	schedule for 7 days a week, 2 runs a day; administer community assessment tool	none
Week 2	orientation to data collection procedure	Dr. Weaver and Adam Saunders	start data collection	Start Food scrap and manure pickup, Build composting bins, Tend garden
Week 3	garden layout lecture; lecture on the decomposition of materials; experimental design discussion	Dr. Chris Starbuck	sample garden layouts, design composting bins	Food scrap and manure pickup, Build composting bins, Tend garden, collect data
Week 4	Experimental design discussion	Dr. Chris Starbuck	determine experimental treatments	Food scrap and manure pickup, Build composting bins, Tend garden, collect data
Week 5	lecture on urban agriculture, soil nutrients, complementary crops	Fred Kirschenmann, Aldo Leopold Center for Sustainable Agriculture	analysis of individual gardens	Food scrap and manure pickup, Tend garden, collect data
Week 6	presentation of individual garden maps		Finalize garden plan for fall planting and next three seasons	Food scrap and manure pickup, Tend garden, collect data
Week 7	GIS mapping the gardens exercise Part 1	Geography professor	maps for each of the 15 targeted gardens	Food scrap and manure pickup, Tend garden, collect data, Map gardens with GPS devices
Week 8	GIS mapping the gardens exercise Part 2	Geography professor	produce aerial maps	Food scrap and manure pickup, Tend garden, collect data
Week 9	dealing with neighborhood groups and constituencies	Bill Mckelvey, President of CGC		Food scrap and manure pickup, Tend garden, collect data
Week 10	students meet with community members to suggest changes to their spring planning		collect comments from each of the community teams of neighbors	Food scrap and manure pickup, Tend garden, collect data
Week 11	Review compost pick up system		1st draft of compost system review	End Food scrap and manure pickup, Tend garden, collect data
Week 12	creation of web tables for reporting	computer lab with Pat Margherio, Sustain Mizzou Webmaster	web based interface that reports the results from the compost system	Tend garden, collect data
Week 13	compilation of data from each of 15 composting piles, statistical analysis			Tend garden, collect data
Week 14	Outline final report,		1st draft final report	prep garden for over wintering, collect data
Week 15	discussion of recommended policy changes and individual action		invite potential stakeholders to review report	prep garden for over wintering, collect data
Week 16	drafting and re drafting of final report and follow up with community organizations regarding use of web based tools		administer evaluation tool; submit semester report	prep garden for over wintering, collect data