

UC Riverside[□] Integrated Pest Management Plan

2017



Office of Sustainability and
Environmental Health & Safety

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University of California, Riverside Integrated Pest Management Plan¹

April 2017

Section 1: Scope

The UC Riverside Integrated Pest Management Plan (IPM Plan) provides guidelines for protecting and enhancing the natural diversity of the UC Riverside main campus and Palm Desert campus, while also supporting high-performance building operations and developing synergies between the building and its environmental context. The project is located at 900 University Ave, Riverside, CA 92521. The IPM Plan applies to all interior spaces within buildings and all portions of the site and grounds defined by the LEED Boundary for the Campus Portfolio Credits pursuant to the Application Guide for Multiple Buildings and On-Campus Building Projects. Pests include plants or animals that are detrimental to the property, a nuisance to building occupants, or unwanted on the building grounds for other reasons.

Section 2: Purpose and Benefits

The purpose of this IPM Plan is to guide the use of environmentally sensitive indoor and outdoor pest management strategies and least-toxic control methods at UC Riverside. Core elements of IPM include:

- Use of least-toxic chemical pesticides
- Minimum use of chemicals
- Use of chemicals and pesticides only in targeted locations and for targeted species
- Routine inspection and monitoring
- Proactive communication

What is Integrated Pest Management?

Integrated Pest Management is a pest management strategy that focuses on long-term prevention or suppression of pest problems with minimum impact on human health, the environment and nontarget organisms.

Preferred pest management techniques outdoors include encouraging naturally occurring biological control; using alternate plant species or varieties that resist pests; selecting pesticides with a lower toxicity to humans or nontarget organisms; adopting cultivating, pruning, fertilizing or irrigation practices that reduce pest problems and changing the habitat to make it incompatible with pest development.

¹ LEED for Existing Buildings: Operations & Maintenance

Preferred pest management techniques indoors include exclusion by sealing cracks, crevices and holes in structures where pests can enter, improved sanitation, trapping and removing pests by hand, and least-toxic chemical controls.

Pesticides are used as a last resort when careful monitoring indicates that they are needed according to pre-established guidelines. When treatments are necessary, the least-toxic and most target specific pesticides are chosen. Implementing an integrated pest management program requires a thorough understanding of pests, their life cycles, environmental requirements and natural enemies, as well as establishment of a regular and systemic program for surveying pests, their damage and other evidence of their presence.

Benefits of Integrated Pest Management

- Promotes sound structures and healthy plants, which better withstand damage from pests
- Reduces the need for pesticides by using several pest management methods
- Reduces excessive or unnecessary pesticide applications, which can negatively affect human health and the environment
- Promotes clean water. If water runoff contains pesticides, these can pollute streams, rivers, groundwater, or coastal regions.
- Typically provides long-term control of pests, as opposed to more conventional short-term treatments
- Usually costs less to use IPM control methods

Section 3: Goals

The goals of the IPM program at UC Riverside are:

1. Protect human health and the surrounding environment by employing a range of preventative strategies and using least-toxic products for pest control and eradication.
2. Inspect and monitor pest populations to enhance control strategies.
3. Minimize the quantity and toxicity of chemicals used for pest management.
4. Minimize environmental impacts by using species-specific pesticides and targeting application areas carefully.
5. Establish clear criteria for acceptable circumstances in which using a pesticide other than a least-toxic pesticide is necessary; toxic pesticides will only be used when there is a threat to public health and safety, or to prevent economic or environmental damage, and only after other alternatives have been implemented and are shown to be ineffective.
6. Provide campus landscape users with advanced notice of IPM activities involving use of a pesticide other than a least-toxic pesticide.

Section 3: Responsible Parties

The UC Riverside staff identified in Table 1 below are responsible for developing and managing the implementation of the IPM Plan.

Environmental Health and Safety (EH&S) personnel are responsible for maintaining the IPM Plan documents, for providing guidance to Departments for implementation of the IPM Plan, and for participation as specialists on IPM committees.

EH&S provides guidance on relevant standards to ensure safety and compliance, including those standards related to workplace hazards, and pesticide storage and application.

EH&S personnel consult to identify and resolve pest infestations such as insects, rodents, reptiles, other pest species and harmful plants that affect public health and safety, and otherwise affect the campus environment.

Table 1 Responsible Parties

Title of Responsible Party	Department	Department Phone	Area of Responsibility
Executive Director, Facilities Services	Facilities Services	(951) 827-4214	
Director, Environmental and Resources Services	Facilities Services	(951) 827-4214	
Assistant Director, Landscape Services	Facilities Services	(951) 827-4220	
Assistant Director, Custodial/Housekeeping Services	Facilities Services	(951) 827-4220	
Executive Director, Dining, Conferences, Events & Catering Services	Dining Services	(951) 827-1202	
Senior Director, Dining Services	Dining Services	(951) 827-5172	
Assistant Dean of Students	Highlander Union	(951) 827-7215	
Facilities Manager	Highlander Union	(951) 827-3611	
Building Maintenance Supervisor	UNEX - Facilities	(951) 827-1697	
Environmental Programs Manager	Environmental Health & Safety	(951) 827-2416	
Biosafety Officer and Environmental Health Specialist	Environmental Health & Safety	(951) 827-2648	
Assistant Biosafety Officer and Environmental Health Specialist	Environmental Health & Safety	(951) 827-4244	

Contracts with pest and landscape management vendors will include extensive language describing their role in the IPM Plan. Contractors involved with various elements of the IPM Plan will carry out their tasks according to their contracts, and report all relevant activities to the aforementioned parties. On occasion, several contractors may be engaged simultaneously in various elements of the IPM Plan at various buildings and grounds. To ensure an effective and

coordinated effort, the building staff responsible for overseeing the IPM Plan will review all proposed activities before implementation.

IPM strategies for the entire site include actions performed by the following service providers (contractors):

Table 2 IPM Service Providers (Contractors)

Function	Company Name	Primary Contact	Phone
Pest Control	RPW Services, Inc.	Paul Webb	(714) 870-6352
Pest Control	Terminix	Tim Byrd	(909) 605-9929

Section 4: Goals and Performance Measurement

This IPM Plan will govern all components of pest management at the project buildings and sites. The practices identified in this Plan will be wholly adopted and used in 100 percent of the pest management scenarios, with the exception of emergency circumstances as defined in this Plan.

Table 3 Performance Measurement

Operational element	Performance target	Performance measurement unit
Cases that do not warrant emergency treatment	Prior to applying chemical pesticides or baits, alternative pest control methods will be used in 100% of cases	Number of cases when alternative pest control methods are used prior to chemical pesticides or baits
Cases that do not warrant emergency treatment	If alternative methods fail, least-toxic pesticides will be used prior to resorting to the use of non-least-toxic pesticides or baits in 100% of cases	Number of cases when least-toxic pesticides are used prior to non-least-toxic pesticides
Occupant notification	In 100% of non-least-toxic pesticide applications, occupants will receive notification according to the notification procedures described below	Number of cases when non-least-toxic pesticide applications occur and occupants receive notification according to notification procedures

Section 5: Performance Assessment Process

The responsible parties will periodically evaluate the success of the Plan. This evaluation may include producing and providing a report on an annual basis to senior management. Whenever possible, the annual reports will include an evaluation of the performance, safety, cost, environmental and public health benefits achieved as a result of its implementation.

Prior to implementation, service providers involved in the Plan will submit all proposed pest management activities to the responsible parties listed in Section 3. Upon reviewing proposed activities, the responsible parties will determine if they meet the criteria of the Plan and approve or deny action.

The responsible parties, listed in Section 3, will regularly communicate with all service providers, and conduct regular site inspections and evaluations to ensure that the Plan is in place and functioning as intended. In addition to ongoing performance assessment measures, the responsible parties will review all practices and products prior to contract renewal (typically annually) to identify opportunities for improvement and expansion of environmentally-friendly practices.

Section 6: Pest Control Strategies and Practices

Integrated Methods

Integrated methods that make use of monitoring and non-toxic preventative measures (e.g., site inspection and maintenance, cultural controls, pest inspection and population monitoring) will be used to proactively manage and minimize pest issues. In the event that monitoring activities reveal a need for the use of pest controls, appropriate control options will be evaluated, and the least-toxic option most likely to be effective will be employed.

IPM Pest Control Strategies

The building interior and exterior will be periodically inspected for the presence of pests and preventive measures will be taken to avoid pests. If any pests are detected, integrated (nonchemical) methods will be implemented as the first control step, including sanitation measures, exclusion measures, and the use of traps.

Sanitation

Potential food and water sources available to pests will be evaluated and minimized or eliminated. This can be done by thoroughly cleaning and maintaining food service areas and break rooms, fixing leaking pipes and faucets, and altering landscape features to eliminate standing water.

Exclusion

Cracks, crevices, and holes in the building envelope will be sealed. A plant-free zone will be maintained immediately adjacent to the building.

Traps

For insects and rodents, non-chemical baits (such as peanut butter) will be used to trap pests. No chemical baits for rodents will ever be used indoors. If chemical rodent baits are necessary outdoors, they will only be used as solid blocks placed in locked outdoor dispensers. No second-generation (single-feed) rodent baits will be used.

Least-Toxic Pesticides

If integrated pest control measures are unable to resolve the problem, least-toxic pesticides will be used prior to resorting to the use of non-least-toxic pesticides. Least-toxic pesticide status applies to any pesticide product, other than rodent bait, that is applied in a self-contained, enclosed bait station placed in an inaccessible location, or applied in a gel that is neither visible nor accessible. Least-toxic pesticides include any pesticide product for which all active ingredients and known inert ingredients meet the least-toxic Tier III hazard criteria under the UC Riverside Reduced-Risk Pesticide List Hazard Screening Process.

UC Riverside Reduced-Risk Pesticide List Hazard Screening Process

UC Riverside conducts a reduced-risk pesticide list hazard screening for all pesticides in use on the main campus. A map of the UCR Reduced-Risk Pesticide List Hazard Screening Process and the current UCR least-toxic pesticide lists are available at the UCR EH&S Environmental Programs webpage: <http://ehs.ucr.edu/environmentalprograms/>.

Emergency Circumstances

Emergency circumstances are those when the presence of a specific pest in a specific circumstance pose an unacceptable risk to students, faculty, or staff health. A pest outbreak is considered an emergency when it poses an immediate threat to public health or will cause significant economic or environmental damage if treatment is prolonged. These circumstances may require prompt attention – where action may need to be taken without any delay associated with notification. Notification of emergency pesticide applications must be given within 24 hours of the application, in accordance with procedures outlined in the “Universal Notification” section of this plan.

The campus should create standard procedures for identifying emergency circumstances and take the safest, most appropriate action. Responsible parties identified for each campus organization are authorized to decide if a circumstance rises to the level of an emergency:

- Pest presents an imminent risk to public health
- The delay associated with notification would lead to significantly greater harm from the pest
- Risk from the pest is greater than risk from the pesticide
- The pesticide can be used in a way to reduce harm to public health

Emergency Steps

- Conference call or brief meeting of authorized responsible parties listed above to determine if the circumstance rises to an emergency considering the definition of emergency circumstances
- Responsible party signs off on a request to use pesticides
- After the emergency has been averted, schedule a meeting with the responsible party, pest management professional and other relevant staff to discuss the problem and how/if it can be avoided next time
- Occupants receive Universal Notification of pesticide use as soon as possible after emergency has been averted. Universal Notification describes what was used and the conditions that gave rise to the emergency

Universal Notification

Notifying building users and occupants of pesticide applications is a critical component of this IPM Plan. Providing the appropriate information at the appropriate time enables individuals to take precautions as they see necessary to protect their personal health. Universal Notification enables building users and occupants, especially high-risk occupants such as children, pregnant women and the elderly, to modify their plans based on pesticide use at the building.

UC Riverside has adopted universal notification protocol if a pesticide, other than a least-toxic pesticide as defined above, must be applied on site. This protocol requires UC Riverside and its service providers to notify building users and occupants at least 72 hours in advance of a

pesticide application under normal circumstances, and no more than 24 hours after an emergency application through posted signs or other means of reaching 100 percent of occupants.

Universal Notification must include the following:

- Pesticide product name
- Active ingredient(s)
- Product label signal word(s) (e.g., “caution”, “danger”)
- Time and location of application
- Contact information for persons seeking more information

Recordkeeping

Recordkeeping is required to demonstrate ongoing compliance with the IPM Plan. All applications of pesticides (including least-toxic options) will be logged. The pesticide application log will include the following information:

- Pesticide Application
 - Date, time, and location of pesticide application
 - Pesticide application manager, pesticide applicator, application equipment used
 - Target pest
 - Type and quantity of pesticide, including trade name and active ingredient
 - EPA Registration Number
 - Least-toxic status (Y/N), i.e., is it on the least-toxic pesticides list (Y/N)
- Universal Notification to Occupants
 - Date, time, and method of notification

Animal & Vegetation Pest Control IPM Best Practices

Environmental best practices described below are incorporated into vendor contracts/SOP language as appropriate:

<i>Chemical Storage Practices</i>	
Storage Areas	<ul style="list-style-type: none"> ▪ Storage areas must be dry, frost-free, well-ventilated and secure. ▪ Storage areas must be situated away from other buildings, especially residential buildings or areas where food or flammable materials are stored. ▪ Storage must be built to resist foreseeable accidents, including leakage and spillage, fires and the weather. Ensure there is no risk of spills polluting ground water and local bodies of water. Floors must be impervious to liquids, anti-slip, chemical-resistant, washable and with a

	<p>means of diverting spills. Drains must lead to sumps or tanks large enough to contain any foreseeable leaks.</p> <ul style="list-style-type: none"> ▪ Shelving must be appropriate for the size of the containers stored in them. Flammable pesticides must be separated from other pesticides. Consideration must be given to possible reactions between chemicals coming in contact with each other.
Labels	<ul style="list-style-type: none"> ▪ Make sure all pest control chemicals are clearly labeled and that the manufacturer's instructions for use are kept with them. ▪ Chemicals must never be placed in unmarked containers.
Product Information	<ul style="list-style-type: none"> ▪ Effective first-aid provisions must be available together with data sheets on all the products in the storage room and the chemical safety precautions. ▪ Emergency telephone numbers must be listed in a key location in the storage facility. These numbers and other emergency facilities must be checked and updated as necessary.
Signage	<ul style="list-style-type: none"> ▪ Display warning signs without attracting unwanted attention.

<i>Chemical Preparation & Handling Practices</i>	
Choosing Chemicals	<ul style="list-style-type: none"> ▪ Identify which pesticides and herbicides are being used and the exact problems they are intended to resolve. The more that is known about the problem, the less chance there is of making a mistake. The words organic, natural and biodegradable in this context do not guarantee that they are safe. ▪ Refer to the UCR least-toxic pesticide lists which identify the screened products and chemicals that meet Tier 3 Hazard Criteria
Mixing Chemicals	<ul style="list-style-type: none"> ▪ Accurate measurements must be made during both mixing and application phases. Use the most suitable chemical, in the minimum necessary amount, to achieve the desired results. ▪ A safe area must be available for mixing pesticides. This must be done on a concrete pad, with a separate sump or tank to contain any leakage.
Health Precautions	<ul style="list-style-type: none"> ▪ Operators must be provided with and adequately trained in the use of the necessary equipment and protective clothing. ▪ Proper health surveillance must be available to all those working with pesticides and herbicides. ▪ Neighbors and others in the area must be warned of the spraying program in advance of and during applications.
Chemical Transport	<ul style="list-style-type: none"> ▪ Only the appropriate quantity of pesticide and herbicide must be removed from the pesticide store for immediate use. ▪ Do not transport chemicals in vehicles used for carrying people or food.

<i>Chemical Application Practices</i>	
User Qualifications	<ul style="list-style-type: none"> ▪ In many instances it will be necessary to call on outside expertise to advice on pest-management problems, particularly in the creation of customized integrated pest management problems, which may require detailed knowledge of the biology and ecology of a particular species. ▪ If pesticides are required, the IPM specialist will communicate with the appropriate responsible party to determine the best product and application in accordance with approval requirements. ▪ A specialist must supervise and control the preparation and use of chemical applications.
Species Considerations	<ul style="list-style-type: none"> ▪ Time the treatment to coincide with the presence of the pest. ▪ Use a selective chemical that has the least effect on non-target species and treat only the area affected.
User Safety	<ul style="list-style-type: none"> ▪ Users must wear protective clothing and headgear, and change clothing and wash thoroughly with soap and water after applying pest control chemicals. ▪ Ensure that anyone handling toxic chemicals never works alone and that the work area is well-ventilated. ▪ Wear a respirator for outdoor spraying or dusting of organic phosphorus compounds ▪ Eating, drinking and smoking must be prohibited when using or handling chemicals ▪ Users must be familiar with the effects on the body of the chemicals they are likely to be using, and how the chemicals may enter the body. ▪ Users must be aware of the signs and symptoms of acute poisoning related to chemicals they are using. They must stop work if they are feeling ill and seek medical advice.
Limited Access	<ul style="list-style-type: none"> ▪ The application area must be clearly marked, and access restricted while spraying is in progress. ▪ Building occupants must be informed of any pest-control management systems. When application or spraying is in progress, they must be warned of this activity and kept away from the area in which it is taking place. ▪ Control the reentry of people into the treated area.
Equipment	<ul style="list-style-type: none"> ▪ Equipment must be frequently checked and properly maintained, both for health and safety reasons and to minimize spray drift.
Weather/Time Restrictions	<ul style="list-style-type: none"> ▪ Spraying must not be carried out in unsuitable weather. Anyone operating sprayers must have access to a wind-speed meter and only spray when the wind speed is negligible. ▪ Hours of work must be controlled so that building occupants are not exposed.

<i>Chemical Disposal Practices</i>	
Conditions of Disposal	<p>As most pesticides and herbicides are toxic, proper disposal of unused chemicals is paramount to maintaining the health of building occupants and the safety of the environment. Disposal methods will depend on:</p> <ul style="list-style-type: none"> ▪ Quantity of waste for disposal ▪ Chemical and biological degradability of the active ingredients ▪ Toxic properties ▪ Concentration ▪ Physical form of the waste ▪ Disposal options available
General Guidelines	<ul style="list-style-type: none"> ▪ Always follow the manufacturer's and/or supplier's instructions even when disposing of empty containers. ▪ Landfilling or incinerating pesticides and herbicides is not an environmentally sound option. ▪ Segregate pesticide/herbicide wastes from general building wastes.
Containers/ Labels	<ul style="list-style-type: none"> ▪ Never transfer pesticides to unlabeled or mislabeled containers. Keep the chemicals in clearly labeled containers even when disposing of them. ▪ Do not reuse pesticide/herbicide containers. ▪ Puncture containers after they have been used to prevent reuse.
Authorization	<ul style="list-style-type: none"> ▪ Use an authorized waste-disposal contractor. ▪ Use an authorized disposal site.

<i>Basic Vegetation Pest Control Practices</i>	
Maintenance	<ul style="list-style-type: none"> ▪ Keep the building grounds well-maintained at all times. ▪ Maintenance personnel will apply mulch to plant beds, warding off weeds and other pests.
Plantings	<ul style="list-style-type: none"> ▪ Plant at the right time and in the right places. Seedlings must not be planted too early, nor located in unsuitable conditions. ▪ Avoid monocultures by mixing plant species in planters and gardens.
Manual Controls	<ul style="list-style-type: none"> ▪ Landscaping will be hand weeded to the greatest extent possible and chemical control will be kept to a minimum. This measure prevents human and environmental exposure to hazardous chemicals.
Chemical Controls	<ul style="list-style-type: none"> ▪ When chemical use is necessary, replace hazardous substances with least-toxic chemicals identified on the UCR least-toxic pesticide lists as screened products and chemicals that meet Tier 3 Hazard Criteria.
Inspection Schedule and Location	<ul style="list-style-type: none"> ▪ The landscape contractor will visit the site at regular intervals to monitor and apply pest controls operations.

<i>Basic Animal Pest Control Practices</i>	
Site/Building Cleanliness	<ul style="list-style-type: none"> ▪ Keep trash containers clean, free of odors and covered at all times. Sanitation measures reduce habitat and food sources for pests. ▪ Keep areas around trash containers free of spillage or trash to prevent the collection of trash or debris on the ground around or underneath the containers. ▪ Keep grounds free of high weeds, trash, old equipment and debris, as these conditions create ideal harborage for rodents.
Structural Integrity	<ul style="list-style-type: none"> ▪ Maintain the building exterior in good repair with no holes or openings larger than ¼ inch including, but is not limited to, windows, doors, fans, vents, etc. Structural repairs prevent pests from entering the building. ▪ Address any deficiencies in the building exterior with corrective measures, i.e., cementing, screening, caulking, installing stripping on door bases, etc. ▪ Maintain door sweeps on all applicable doors to produce a good seal to the ground.
Inspection Schedule and Location	<ul style="list-style-type: none"> ▪ Visual inspections will be performed at least 2 times per month, with treatment if necessary. After each visit, the pest contractor will provide a printed service report that includes written observations, recommendations and details of IPM activities.

<i>Species-Specific Pest Control Strategies</i>	
Ants <u>UC IPM Pest Notes - Ants</u>	<p><i>Indoor:</i></p> <ul style="list-style-type: none"> ▪ In areas where ants are present, wipe the areas down with soapy water in order to prevent the formation of major scent trails. If there already is an established trail, wipe backwards from the food source to the entrance of the trail. ▪ Block all entry points to the building – ants will give up trying to find a way through after 1-2 days. ▪ Always keep opened foodstuffs in sealed containers or store them in the refrigerator or freezer. Clean out kitchen cabinets, drawers and shelves to remove crumbs and stains. Keep sinks and worktops clean and dry. ▪ Baits are best put in the path of an ant trail and then removed after the ant activity stops, before they lure ants from another colony to the area. <p><i>Note: Baits should be used primarily outdoors – use indoors only if there is a serious infestation and you can't find where they are entering. Otherwise, baits may attract ants indoors.</i></p> <p><i>Outdoor:</i></p> <ul style="list-style-type: none"> ▪ Prune branches close to the building and removed fences or anything that might create a bridge for the ants to cross. ▪ Protect young/sensitive trees by wrapping the trunk with sticky substances (i.e. duct tape, fabric tree wrap, Tanglefoot). Check material every 1 or 2 weeks and stir to prevent clogging of material. ▪ Apply mulches that repel ants and discourage nesting (i.e. pencil cedar).

<i>Species-Specific Pest Control Strategies</i>	
	<ul style="list-style-type: none"> ▪ Low toxicity compounds to control ants include diatomaceous earth (DE), a chalk-like powder consisting of the fossilized remains of diatoms, a type of hard-shelled algae.
<p>Aphids</p> <p><u>UC IPM Pest Notes - Aphids</u></p>	<ul style="list-style-type: none"> ▪ Although aphids seldom kill a mature plant, the damage they do and unsightly honeydew they generate sometimes warrant control. Consider the nonchemical controls discussed below, as most insecticides will destroy beneficial insects along with the pest. On mature trees, such as in citrus orchards, aphids and the honeydew they produce can provide a valuable food source for beneficial insects. ▪ Manage aphids, sap-sucking pest mites and whiteflies by releasing predatory mites, ladybugs and lacewings onto the grounds several times over a period of weeks. ▪ Consider using parasitic wasps to control aphids, and scales on trees, shrubs and flowers. ▪ If it is difficult to obtain supplies of beneficial insects for release into the garden, then it is possible to purchase a branded lure that simulates the scent of aphids and attracts ladybugs and lacewings to the area. ▪ High levels of nitrogen fertilizer encourage aphid populations – never use more nitrogen than necessary, use less soluble forms, or switch to a urea-based slow release fertilizer.
<p>Bed Bugs</p> <p><u>UC IPM Pest Notes - Bed Bugs</u></p>	<ul style="list-style-type: none"> ▪ If a bed bug infestation is detected, the most effective course of action is to enlist professional help to inspect the entire building for the presence of bed bugs and to treat the affected areas. ▪ Confirmed bed bug infestations should be managed by trained professionals. Managing a bed bug infestation is a difficult task that requires removing or treating all infested material and follow-up monitoring to ensure the infestation has been eliminated.
<p>Cockroaches</p> <p><u>UC IPM Pest Notes - Cockroaches</u></p>	<ul style="list-style-type: none"> ▪ There are five main species of cockroaches and effective control depends on identifying them correctly. <i>Species Information:</i> <ul style="list-style-type: none"> ○ German cockroaches have the greatest potential for becoming persistent and troublesome. They prefer <i>indoor</i> locations in kitchens, bathrooms, food preparation and storage areas. ○ Brownbanded cockroaches prefer warm areas <i>indoors</i>, behind pictures on walls, in hollow legs of furniture, and in clutter. ○ Oriental cockroaches (sometimes referred to as a waterbug/waterbeetle) live <i>outdoors</i> in cool damp, dark places like woodpiles, ivy, ground cover, garages, basements, water meter boxes, and outdoor drains. ○ Smokybrown cockroaches are usually found <i>outdoors</i> in planter boxes, trees, shrubs, vegetation, and upper parts of buildings. ○ American cockroaches usually live <i>outdoors</i> in sewers, water meter boxes, storm drains, steam tunnels, and animal-rearing facilities.

Species-Specific Pest Control Strategies

	<ul style="list-style-type: none"> ○ Turkestan cockroaches live <i>outdoors</i> in water meter boxes, cracks between blocks of poured concrete, compost piles, leaf litter, and potted plants. <p><i>Indoor:</i></p> <ul style="list-style-type: none"> ▪ Cockroaches contaminate food with their excrement and secrete and unpleasant odor that can permeate the indoor environment. ▪ Integrated pest management measures for controlling cockroaches include effective hygiene and exclusion practices, sticky traps lined with pheromones, and insect growth regulators. ▪ All food handling areas should be cleaned frequently. ▪ Cockroach control is best done by a professional on a contract basis, through the application of least-toxic pesticides. ▪ Control is necessary on a regular basis because of the mobility, reproduction, longevity, and behavior of cockroaches. ▪ Ensure that you know what pesticides are being used by the professional contractor and do not assume they are using an environmentally appropriate chemical. <p><i>Outdoor:</i></p> <ul style="list-style-type: none"> ▪ Trim shrubbery around buildings to increase light and air circulation, especially near vents, and eliminate ivy or other dense ground covers near the house, as these may harbor cockroaches. ▪ Remove trash and stored items from around the outside of buildings such as stacks of lumber, firewood, or cardboard boxes that may provide hiding places.
<p>Flies</p> <p><u>UC IPM Pest Notes - Flies</u></p>	<p><i>Indoor:</i></p> <ul style="list-style-type: none"> ▪ Suppression of larval development sites and reducing adult attractants to the building is the most effective control method. ▪ Ensure trash bin lids fit tightly and remain closed, and the interiors of bins are cleaned regularly to keep surfaces free of food material. ▪ Use fine mesh window and door screens as a barrier against entry by any flying insect. ▪ Ultra-violet (UV) fly killing equipment is very effective so long as it is situated correctly. ▪ UV equipment disguised as uplighters in dining and lobby areas are discreet and highly effective because they attract and eliminate flies quickly and silently. ▪ Position the UV equipment close to an entry point, at right angles to the nearest competing light source such as a window. In many catering establishments, poorly-situated UV equipment poses a greater food hygiene hazard than lacking pest repellants altogether. This is because when placed next to the food preparation area, they draw flies to the food which they are likely to contaminate before being killed. ▪ Natural chemical treatments include pyrethrum extracted from the <i>Chrysanthemum cinerariaefolium</i> plant that can be used in kitchens and restaurants.

Species-Specific Pest Control Strategies

	<ul style="list-style-type: none"> ▪ In food preparation areas, UV equipment should only be used once all possible precautions have been taken to keep flying insects out. <p><i>Outdoor:</i></p> <ul style="list-style-type: none"> ▪ Flies reproduce more readily in waste and manure, which is where control should begin. In warm weather conditions, the reproduction cycle – from egg, to larva, to pupa, to adult winged fly – requires approximately one week. ▪ Collection of waste and residues should be carried out at least twice a week. ▪ Keep refuse areas clean to avoid providing flies with breeding grounds.
<p>Rats</p> <p><u>UC IPM Pest Notes - Rats</u></p>	<ul style="list-style-type: none"> ▪ A successful rat control strategy typically includes three elements: sanitation measures; building construction and rodent proofing; and, if necessary, population control. <p><i>Indoor:</i></p> <ul style="list-style-type: none"> ▪ Rat control should start with a survey to determine the source of the problem and the conditions that encourage the infestation. Following the survey, implement a program to kill the rodents, removing their sources of food and water, eliminating their place of refuge and making it rodent-proof, and educating and obtaining the cooperation of employees. If the food supply is removed before you eradicate them, the rodents will migrate to other areas, making elimination more difficult. ▪ Openings in building foundations and walls should be closed or screened with wire mesh that has holes not more than 1.25 cm (1/2 inch) wide. No hole larger than 1/4 inch should be left unsealed. ▪ Where pipes enter masonry, force heavy hardware cloth or steel wool into the opening, then fill it with concrete. Plastic sheeting, wood, caulking, and other less sturdy materials are likely to be gnawed. ▪ Continuous surveillance is necessary, and places where rodents have been gnawing to gain entry to a building should be sealed with metal flashing. ▪ Doors are particularly vulnerable to rodent entry so ensure that external doors and windows close tightly with no gaps at the bottom. Young rats can enter gaps as small as 1/4 inch. ▪ Materials stored in the open, in sheds or in building should be stacked at least 30 cm (1 ft.) above the ground. ▪ Stringent waste disposal practices should be observed – secure all waste in closed containers and not just plastic bags. ▪ Wash trash collection areas regularly. Make sure composting bins are designed to prevent rodents from entering. ▪ Traditional mouse and rat traps, or snap traps, kill instantly. If trapping efforts fail, it is usually due to too few traps being used. Glue boards and live traps are not recommended. ▪ For Norway rats, set traps close to walls, behind objects, in dark corners, and in places where rat signs, such as droppings, have been seen. Position traps against walls at right angles.

<i>Species-Specific Pest Control Strategies</i>	
	<ul style="list-style-type: none"> ▪ For roof rats, place traps off the ground on ledges, shelves, pipes, or overhead beams and secure them with screws or wire. ▪ Avoid using baits indoors, because dead rats create bad odors. ▪ Seal buildings before baiting outside to prevent poisoned rats from coming inside to die. <p><i>Outdoor:</i></p> <ul style="list-style-type: none"> ▪ Tamper-proof bait stations are available but can only be used within 50 feet of a building. ▪ Provide a tight fitting cover for crawl spaces and seal all openings around pipes, cables, and wires that enter through walls or the foundation. ▪ Cover all chimneys with a spark arrester and make sure internal screens on roof and attic air vents are in good repair. ▪ Thin or remove vegetation such as climbing hedges and overhanging tree limbs. Separate canopies of trees by 2 feet or more from each other, and at least 3 feet away from the roof of the building.
<p>Slugs and Snails</p> <p><u>UC IPM Pest Notes – Snails and Slugs</u></p>	<ul style="list-style-type: none"> ▪ There are various non-chemical solutions to eliminating slugs and snails. These include management practices such as eliminating their daytime hiding places as much as possible, and switching from sprinkler irrigation to drip irrigation. Raised board traps and copper foil barriers are effective non-chemical control and repellent methods.
<p>Social Wasps</p> <p><u>UC IPM Pest Notes – Yellowjackets and Other Social Wasps</u></p>	<ul style="list-style-type: none"> ▪ It is best to avoid wasps when you discover their nests, as they are very defensive and can sting multiple times. ▪ Wasps will usually not cause a problem if there is no available food. ▪ A simple trap can be made by putting beer or a solution of jam or honey and water in an open jar around the grounds. If this does not work, there are branded traps available containing specially formulated attractant baits. ▪ If the wasps are a severe problem, it is best to contact a professional.
<p>California Ground Squirrel</p> <p><u>UC Ground Squirrel Management for California</u></p>	<ul style="list-style-type: none"> ▪ <u>UC best management practices</u> are advised for California Ground Squirrel control. They are the most effective, most cost efficient and environmentally friendly management methods to date to deal with California ground squirrels. These practices involve application of appropriate control methods during breeding and foraging seasons. No control methods are effective during the hibernation season between November and January.

Section 7: Effective Date and Term

This Plan will take effect on <DATE> and will continue indefinitely or until amended and/or replaced by a subsequent integrated pest management plan.

Section 8: Definitions

Emergency Circumstances: When the presence of a specific pest in a specific circumstance pose an unacceptable risk to students, faculty, or staff health. A pest outbreak is considered an emergency when it poses an immediate threat to public health or will cause significant economic or environmental damage if treatment is prolonged.

Integrated Pest Management (IPM): The coordinated use of knowledge about pests, the environment, and pest prevention and control methods to minimize pest infestation and damage by the most economical means while minimizing hazards to people, property, and the environment.

Integrated Pest Management is a pest management strategy that focuses on long-term prevention or suppression of pest problems with minimum impact on human health, the environment and nontarget organisms.

Preferred pest management techniques outdoors include encouraging naturally occurring biological control; using alternate plant species or varieties that resist pests; selecting pesticides with a lower toxicity to humans or nontarget organisms; adopting cultivating, pruning, fertilizing or irrigation practices that reduce pest problems and changing the habitat to make it incompatible with pest development.

Preferred pest management techniques indoors include exclusion by sealing cracks, crevices and holes in structures where pests can enter, improved sanitation, trapping and removing pests by hand, and least-toxic chemical controls.

Pesticides are used as a last resort when careful monitoring indicates that they are needed according to pre-established guidelines. When treatments are necessary, the least-toxic and most target specific pesticides are chosen. Implementing an integrated pest management program requires a thorough understanding of pests, their life cycles, environmental requirements and natural enemies, as well as establishment of a regular and systemic program for surveying pests, their damage and other evidence of their presence.

Green Cleaning: The use of cleaning products and practices that have lower environmental impacts and more positive indoor air quality impacts than conventional products and practices.

Least-Toxic Pesticide: Any pesticide product, other than rodent bait, that is applied in a self-contained, enclosed bait station placed in an inaccessible location or applied in a gel that is neither visible nor accessible; also applies to any pesticide product for which all active ingredients and known inert ingredients meet the least-toxic Tier 3 hazard criteria under the San Francisco Hazard Review Process; also applies to pesticides listed on UCR least-toxic pesticide lists generated by the UC Riverside Reduced-Risk Pesticide Screening Process.

Universal Notification: Notifying building occupants not less than 72 hours before a pesticide is applied in a building or on surrounding grounds under normal conditions, and within 24 hours after application of a pesticide in emergency conditions. Use of a least-toxic pesticide or self-contained non-rodent bait does not require universal notification; all other pesticide applications in a building or on surrounding grounds require universal notification.

Section 9: Resources

EQc Integrated Pest Management plan template, LEED version:v4, U.S. Green Building Council, 23 May 2014, <http://www.usgbc.org/resources/eqc-integrated-pest-management-plan-template>

Guide to the San Francisco Reduced Risk Pesticide List (September 2013). How the City's Reduced-Risk Pesticide List is created, including the Hazard Tier Review Process used by managers of LEED-certified green buildings. Updated September 11, 2013.
<https://sfenvironment.org/download/guide-to-the-reduced-risk-pesticide-list-revised-2013>

Integrated Pest Management Plan – Facilities Management – UC Davis,
http://facilities.ucdavis.edu/building_maintenance/UC%20Davis%20Integrated%20Pest%20Management%20Plan%20Updated.doc

UC IPM, Statewide Integrated Pest Management Program, University of California Agriculture & Natural Resources, <http://ipm.ucanr.edu/>