**UNIVERSITY OF HAWAI'I AT MĀNOA**  
**UHM-1 FORM (ADD A COURSE)**

See Guidelines for instructions and deadlines. For undergraduate courses, submit an original and 4 copies; graduate courses, submit an original and 6 copies. If cross-listed, include extra copies for cross-listed department(s) & college(s). List one course per form. Attach additional sheets as needed.

1. **Course Subject**: PEPS  
2. **Course Number**: 418  
3. **Effective Term (semester & year)**: Fall 2014  
4. **Frequency (check all that apply)**:  
   - Fall semester  
   - Spring semester  
   - Alternate years  
   - Summer semester

5. **Offering Status (check one)**:  
   - Regular  
   - Experimental  
   - Single-term

6a. **Full Course Title (Alpha courses: attach separate sheet & specify title for each alpha)**: Turfgrass Pest Management  
6b. **BANNER Course Title (30 characters max, including spaces/punctuation. Alpha courses: attach separate sheet & specify title for each alpha)**: Turf Pest Management

7. **Grade Option (check all that apply)**:  
   - Letter Grade  
   - Satisfactory/Unsatisfactory  
   - Credit/No Credit  
   - Audit  
   - Honors (Medicine only)

8. **Gen Ed Core or Hawaiian/Second Language Requirement Designation (check one)**:  
   - Do not consider for Core or Hawaiian/Second Language designation.  
   - Request approval of ________ Diversification (DA, DH, DL, DB, DP, DY, DS), Foundations (FW, FS, FG), or Hawaiian/Second Language (HSL) designation. (For Foundations, also submit a proposal to General Education Office.)

   **GEC Use:**  
   - Approve  
   - Deny

   **GEC Initials**

9. **Contact Hours (meeting hours per week - if variable, specify range)**: 6  
10. **# of credits (if variable, give range)**: 4

11. **Repeat Limit**: unlimited  
12. **Credit Limit**: 4

13. **Schedule Type (check all that apply)**:  
   - Lecture (LEC)  
   - Laboratory (LAB)  
   - Seminar (SEM)  
   - Lecture/Discussion combined (LED)  
   - Lecture/Laboratory combined (LEL)  
   - Thesis/Dissertation (THD)  
   - Directed Reading or Research (DRR)  
   - Field Experience/Internship/Practicum (PRA)

14. **Co-requisite Course(s)**: NA

15a. **Major Restriction (as it should appear in Catalog)**: NA

15b. **Banner codes of acceptable majors**: NA

16. **Class Standing Restriction**: NA

17a. **Prerequisite Course(s)**: (Use "and", "or", and punctuation to indicate relationships between prerequisites. "Or consent" is implied for ALL prerequisites. Consent requirements can be implemented through your class schedules each semester.)

17b. **Minimum required grade for prerequisites**: NA

17c. **Blanket requirements listed in Catalog (if none, write "none")**: none

18. **Catalog Description (Limit 35 words; 85 words for alpha courses)**: This course provides students with knowledge and real-world experience on common turfgrass pests and management strategies in Hawaii, with emphasis on integrated pest management. Common cool-season turfgrass and pest management are also discussed.

19. **Justification** Attach separate sheets and indicate the rationale for the request, expected course enrollment, and a course syllabus specifying student learning objectives for the course. Syllabi are not required for "99" courses.

20. **Cross-listed or Honors Course(s)**:  
   - **Course Subject & Number**  
   - **Chair/Director**  
   - **Signature**  
   - **Date**

21. **Requested By**  
   - I certify that the student learning objectives for the course are consistent with the learning objectives of each program under which the course is listed.

   **PEPS**  
   - **Mark Wright**

   **Department/Unit**

   **Signature**  
   - **Date**

22. **Approved By**  
   - **1st College or School**
   - **Dean**
   - **Signature**  
   - **Date**

   **2nd College or School**
   - **Dean**
   - **Signature**  
   - **Date**

   **General Education (Undergraduate courses numbered 100-499)**
   - **Director**
   - **Signature**  
   - **Date**

   **Graduate Division (600 level and above)**
   - **Dean**
   - **Signature**  
   - **Date**

   **Mānoa Chancellor's Office**
   - **Vice Chancellor for Academic Affairs**
   - **Signature**  
   - **Date**
Rationale for the request

1. Why is the course being requested?

This is an original course that is offering a subject area not addressed in CTAHR currently. My position as an assistant specialist in turfgrass and landscape pest management gives us a good opportunity to develop a course in this greatly needed area. At this time, most courses offered in plant pest management focus primarily on agricultural systems, while this course focuses on specific pest management issues in turfgrass systems (including golf courses, athletic fields, home lawns, and recreation areas). Turfgrass areas have become a central part of urban and suburban landscapes throughout North America and in Hawaii. In Hawaii specifically, the golf industry makes significant contribution to Hawaii’s economy. In addition, extensive lawns, landscapes devoted to turf, and other recreation areas represent an important investment in land management. Due to biology, ecology, intensive management and disturbances, turfgrass systems have unique pest issues and management challenges compared to vegetable and cropping agricultural systems. The main purpose of offering this course is to provide students with intensive training in turfgrass pest management practices, with emphasis on the integrated pest management (IPM) strategies for the tropical environment. This course will therefore be most attractive to students who are interested in a career in the “green” industry, as well as expand and deepen CTAHR’s impact in Hawaii’s turf and landscape industry.

2. How will the course content be organized?

Lectures: Introductory lectures will be given on origin of turf, turfgrass structure and morphology, turf/soil ecosystem, soil food webs, turf and the environment, and common warm-season turfgrass species. The course will then focus on turf IPM, with various turf IPM components to be covered, including turf selection, establishment, cultural practices, turf insect, weed, and disease control, and other common turf pest control. Both biological and chemical pest control methods will be discussed. At the end of the semester, common cool-season turfgrass species and their pest management will be discussed.
Lab/field trips: In the beginning of the semester, students will discuss and decide the group class projects. While working on the class projects, field trips will be made to various locations, including golf course, athletic field, turf sod farm, Magoon turf research facility, and so on, so students can obtain real-world experience related to turf pests and management through interactions and discussion with turf professionals at these places, as well as observing their pest management activities. During several lab sessions, students will also learn how to measure soil parameters (such as pH, texture, nitrogen pools, SOM, and so on), and soil food webs. At the end of the semester, students will submit a written group project report, and make a presentation for the group class project they participated.

Please see attached syllabus for more details of the course organization and requirements.

3. What other courses at UHM closely parallel the proposed course and in what way will the latter make a distinct contribution?

This course is unique because it is focused specifically on turfgrass systems. This course may be somewhat parallel to PEPS 421 (Foundations of Pest Management), PEPS 430 (Plant Disease Management), and PEPS 481 (Weed Science) in terms of some aspects of general pest management practices. PEPS 421, PEPS 430, and PEPS 481 focus on insects, diseases, and weeds, respectively. However, this course will emphasize on specific, oftentimes unique, pest and management issues in turfgrass systems, rather than broad pest issues (mainly in agroecosystems) that are addressed in PEPS 421, PEPS 430, and PEPS 481. These include turf establishment, cultural management, turf insect control, turf weed control, turf disease control, other common turf pest control, as well as the relationships between soil food web and turfgrass health. Therefore, this course will complement many aspects of pest management (specific to turfgrass systems) that will not be specifically covered (or emphasized) in PEPS 421, PEPS 430, and PEPS 481. On another note, TPSS 405 (Turfgrass Management) is a similar course to some degree, but it is focused on general cultural practices, rather than on comprehensive pest control strategies covered by this course. In addition, TPSS 405 is not actively and routinely offered any more. Therefore, the distinct contribution of this course is to familiarize the students with hands-on and real-world experience in observing and handlings common pest issues in turfgrass systems, especially in Hawaii.

4. Where and how does the proposed course fit into the current and future curriculum?

Turfgrass areas have become a central part of urban and suburban landscapes throughout North America. In the State of Hawaii specifically, the golf industry makes significant contribution to Hawaii’s economy. In addition, extensive lawns, golf courses, and other recreation areas represent an important investment in land management, especially in the case of Hawaii. This course serves as a key course to develop Turfgrass Pest Management extension and research program in CTAHR curriculum. The course will provide information and skills regarding major pest issues and management strategies in turfgrass systems faced by the “green” industry in Hawaii, and expand and deepen CTAHR’s impact in Hawaii’s turf and landscape industry. This course also fits into the overall education goals of “Plant and Environment Protection Sciences”,...
where students need to demonstrate an understanding of the environment as a complex, as well as demonstrate understanding of the biology, ecology, and impact of pest and beneficial organisms. This course will also integrate and build significantly upon the knowledge and skills gained by students in PEPS 421, PEPS 430, and PEPS 481.

5. Why is the number of credits and level justified? Explain the prerequisites.

The number of credits (4) for the proposed course is justified by the weekly number of lecture minute (150 minutes = 3 credit hours) plus weekly laboratory minutes (150 minutes = 1 credit hour). Prerequisite is PEPS 210 (Intro to Environmental Science), or consent. This prerequisite is to ensure the students are familiar with basic concepts and issues related to the environment and pests. In addition, having taken PEPS 363/363L (General Entomology & Laboratory) and PEPS 405 (Plant Pathogens and Diseases) will be very helpful when attending this course, although these are not official prerequisites.

6. How will the course assist students to achieve the critical skills and competencies of CTAHR graduates?

The course will assist students in achieving the following CTAHR critical skills:

- **Written communications**: One of the student assignments is to turn in a written report on their group class project. Students need to prepare a project report according to scientific writing format.
- **Oral communications**: Each student will prepare a power point presentation summarizing the outcome of their group class project. They will have opportunities to practice public speaking in front of their class, listen to and answer questions from their audience.
- **Analytical/Problem solving skills**: Students will need to define/design their group class projects, which deal with common pest issues in turfgrass systems, and then research and find out the best approach to address those pest issues. Then the best approach identified will be evaluated by peers (other students in the class).
- **Personal characteristics**: Independent work and scientific integrity.
- **Human relations skills**: Through the group class projects, students will develop their human relation skills to work together and to solve problems. They will also develop human relations skills by interacting with turf professionals (golf course manager/staff, sod farm manager/staff, and other UHM staff) who could be interested in receiving consulting advice or offering their perspectives of pest management which may differ from the students.
- **“Real world experience”**: One of the emphases of this course for the students is to obtain real-world experience in terms of pest issues and management in turf systems. To achieve this, multiple field trips will be made to golf course, athletic field, sod farm, and UH turf research facility, where students will interact with turf professionals at these places to learn the daily issues and challenges they need to deal with, and provide suggestions based on what have been discussed in the class. Thus, while learning in the class, the student will also experience a real world economic enterprise producing, using, and managing turf.
• Computer skills: Students will have ample opportunities to use computer and software to prepare their reports and power-point presentations, use library search for scientific articles, and practice on analyzing data, and making graphs/tables.
• Global perspective: Although this course will mainly focus on turfgrass pest management in Hawaii, many lectures prepared by the instructor will in fact summarize global perspective on issues related to the specific topic, such as origin of turf, turfgrass structure and morphology, turf/soil ecosystem, turf and the environment, and soil food webs. Cool-season grasses (in addition to warm-season grasses) will also be discussed in class to give student a global perspective on additional turf species. Students are encouraged to review literatures conducted by scientists throughout the world related to their group class project.

7. How will students be evaluated?

The main evaluation lies on completing a group report on a small-scale class project conducted during the semester. The students will work in a group to do literature search, sample collections, and report on the project through the guidance of the instructor. Students will also be evaluated by their presentation skills on their group project. They will also be evaluated on their participation in lab/field visit by how they would handle the problems raised by turf professionals, or by asking turf professionals questions. In several lab sections (such as soil parameter analyses, soil food web analysis), they will be evaluated on their lab performances and lab reports. Students will also be evaluated on their understanding of a subject through a mid-term and final written exam.

8. What are the minimum qualifications for teaching this course? Is a qualified instructor now available?

The instructor should have a Ph.D. in Environmental Science, Entomology, or Plant Pathology with extensive research experience in turfgrass and soil systems, and have connections with turf professionals (golf course, sod farm, athletic field, and university staff). An instructor is available (Dr. Zhiqiang Cheng).

9. How will the course be financed, assuming no further cutbacks?

The course will be financed by normal departmental operating funds for teaching. Certain equipment and tools (such as pH meter, turf and soil sampling tools), and the cost of a few basic soil assays conducted by the Agricultural Diagnostic Service Center at CTAHR will be covered by Dr. Cheng’s research funds.

10. Has the course been offered before? Is there a demand for it?

The course has not been offered before. CTAHR and PEPS both indicate that there is a demand for this course, and expect to meet this demand by hiring a new faculty member (Dr. Zhiqiang
Cheng), who has the responsibility to teach this course. PEPS Chair, Dr. Mark Wright, indicates that this will be an important new course for PEPS undergraduate program, as well as for graduate students who are interested. TPSS faculty, Dr. Joe DeFrank, and several other turf professionals (golf course superintendents, sod farm owners) indicate that there are demands for this course, so more students in CTAHR can be trained to develop a career in the “green” industry.

11. Is the course cross-listed with another department?

No. But TPSS faculty, Dr. Joe DeFrank, has indicated his strong willingness to support this course by participating in this course, and providing his turf experimental plots in Magoon facility for the students’ use. Interested TPSS students are highly encouraged to attend this course.
PEPS 418 Syllabus
Turfgrass Pest Management
Lectures: Tuesday 1:30 to 2:45; Thursday 1:30 to 2:45
Lab: Wednesday 1:30 to 4:00
Credits (4)

Instructor: Dr. Zhiqiang Cheng (Gilmore 609, cheng241@hawaii.edu)

A. Course Description:

In this course students will learn turfgrass pest management in golf course, athletic field, home lawns, and other landscapes. Turfgrass selection, establishment, and soil conditions will be discussed. An integrated pest management (IPM) approach will then be emphasized for control of insects, weeds, diseases, and other common turf pests during turf maintenance. Emphasis is on management of pests in warm-season turfgrasses, but pest management in cool-season turfgrasses will also be discussed. Students will gain hands-on and real-world experience with collection, diagnosis, and management of common turfgrass pest problems in Hawaii, as well as measuring soil properties and food webs related to turf health.

B. Student Learning Objectives/Outcomes:

On broader sense, this course will contribute to the following PEPS Program Student Learning Objectives:

1) Students will demonstrate understanding of the biology, ecology, and impact of turfgrass pests.
2) Students will be able to diagnose problems in turfgrass systems, and develop management strategies.
3) Students will be able to communicate (oral, written) effectively about plant and environmental protection with respect to turf ecosystems.
4) Students will demonstrate the ability to collect, manage, present, and critically interpret data and information in an ethical way.

More specifically, upon successful completion of this course, students are expected to be able to do the following:
1) Describe major warm- and cool-season turfgrasses, and know their cultural requirements.
2) Understand the importance of soil properties and food webs related to turfgrass growth and health.
3) Establish turf from seed or sod.
4) Recognize common turf problems (biotic, abiotic).
5) Describe the functions of major nutrients essential for turf, and describe deficiency symptoms.
6) Understand proper turf fertilization, mowing, and irrigation practices.
7) Understand turfgrass IPM program, and be able to discuss major components.
8) Identify common turf insects, and know control methods.
9) Identify common turf weeds, and know control methods.
10) Identify common turf diseases, and know control methods.
11) Learn of other common turf pests, such as nematodes, slugs, etc., and know control methods.

C. Reference Books:

D. Class Structure:

There will be 150-min lectures each week, and 150-min lab/field trip each week, except for holidays. Detail of class topics and lab/field trip are provided below. There will be two exams during the course of the semester.

Syllabus

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture/Lab/Field Trip</th>
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| 1    | Lectures: *Introduction to the origin of turf, and turf/soil ecosystem; Turf and the environment (pros and cons).*  
Lab: Make a master plan for class projects. Group (or individual, depending on the size of the class) projects on various aspects of turfgrass pest management (insects, weeds, diseases, and other common pests), based on students’ interests. |
| 2    | Lectures: *Introduction to soil food web, and its importance in supporting turfgrass; Turfgrass structure and morphology; Common warm-season turfgrasses.*  
Field trip: Visit Hawaiian Turfgrass (sod farm) to learn about common warm-season turfgrasses, and new/enhanced turf varieties. Practice on how to take soil samples in order to measure soil properties and food webs. |
| 3    | Lectures: *Introduction to turf management, and turf IPM; Turfgrass establishment: seeding and sodding.*  
Lab: Basic soil analyses (pH, texture, NO₃-N, NH₄-N, SOM, etc.) related to turf quality. |
| 4    | Lectures: *Cultural management of turf: fertilization, mowing, irrigation, aeration, thatching, and more.*  
Field trip: Visit Magoon field facilities to obtain hands-on experience on fertilization, irrigation, and mowing, such as mower usage and maintenance, |
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<thead>
<tr>
<th>Week</th>
<th>Lectures</th>
<th>Lab</th>
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| 5    | *Lectures: Essential macro- and micro- nutrients for turf growth and health; common nutrient deficiency and abiotic issues in warm-season turfgrasses, and methods to manage these issues.*  
Lab: Complete soil analyses (from Week 3); Soil food web measurement, Part 1 (nematode as indicators). |
| 6    | *Lectures: Common turfgrass insect pests in Hawaii.*  
Lab: Finalize group class project design; begin to collect insect/weed/disease/other pest, and corresponding affected turf tissues from turf areas, as well as literature search afterwards. |
| 7    | *Lectures: Control common turfgrass insect pests in Hawaii: biological control; chemical control (insecticide selections).*  
Lab: Review session for Mid-Term. |
| 8    | *Mid-Term Exam (Written Exam); Lectures: Common turfgrass weeds in Hawaii.*  
Lab: Soil food web measurement, Part 2 (nematode as indicators). |
| 9    | *Lectures: Common turfgrass weeds in Hawaii (continued); Control common turfgrass weeds in Hawaii: chemical control (herbicide selections); alternative weed control methods.*  
Lab: Continue collecting insect/weed/disease/other pest, and corresponding affected turf tissues from turf areas, and related literature search. |
| 10   | *Lectures: Common turfgrass diseases in Hawaii.*  
Field trip: Visit a golf course to obtain real-world experience on turfgrass issues and pest management in golf course (interact with golf management professionals, observe turf maintenance, and pesticide applications, and so on). |
| 11   | *Lectures: Control common turfgrass diseases in Hawaii: chemical control; alternative disease control methods.*  
Lab: Review progress of group class projects, and continue working on these (collection, literature search). |
| 12   | *Lectures: Other common turfgrass pests in Hawaii: nematodes, secondary pests, etc., and their management.*  
Field trip: visit soccer complex to obtain real-world experience on turf issues and pest management in athletic field setting (interact with athletic field management professionals, observe turf maintenance, and pesticide applications, and so on). |
| 13   | *Lectures: Introduction to cool-season turfgrasses; comparing cultural management practices between cool- and warm-season turfgrasses.* |
Lab: Complete group class projects.

Lectures: Common pests (insects, weeds, diseases, others) in cool-season turfgrass systems; methods to control common cool-season turfgrass pests.

Lab: Review session for Final Exam.

Class project presentations by groups.

Final Exam (Written exam)

E. Assignment (Student Evaluation):

1. Students are expected to engage in lecture, lab/field trip activities and discussion.
2. There are at least 4 group class projects (depending on class size and students’ interest) as listed in the syllabus. Each group project will focus on one of the four major pest categories (insects, weeds, diseases, and other common pests). Each student will pick one of the projects and work in a group. Students will work with the instructor at the beginning of the semester on their responsibility for their project. Students will be responsible in collecting turfgrass insects/weeds/diseases (affected turf tissues)/other pests of their choices, as well as corresponding affected turf tissues (above- or below-ground tissues), and explore available cultural/chemical/biological methods to control those by literature search. The goal of each group class project is to collect at least 5 common pests in the respective category (and corresponding affected turf tissues), describe their damages/symptoms/impacts, and then identify the “best” method(s) to control those pests.
3. Each group needs to submit a group project written report summarizing all the exercises, efforts, and comments on the student learning experience obtained through the group project at the end of the semester.
4. Each group needs to summarize their written project and present it to the class a 30-minute power point presentation. Each member in the group has to take turn to present a portion of the talk. This presentation will be evaluated by all classmates and instructor based on the quality of the power point presentation, introduction and comparisons of available control methods for selected pests, and conclusions made.
5. In several lab sections (soil parameter analyses, soil food web analysis) where all students will participate in additional to the group class projects, students will need to turn in individual lab reports (due Monday for the lab session in the previous week).

F. Grading System:

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<tr>
<th>Description</th>
<th>Points available</th>
<th>% of Grade</th>
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<tbody>
<tr>
<td>Participation in lecture, lab/field trips</td>
<td>75</td>
<td>15</td>
</tr>
<tr>
<td>Individual lab report</td>
<td>75</td>
<td>15</td>
</tr>
<tr>
<td>Mid Term Exam</td>
<td>100</td>
<td>20</td>
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<tr>
<td>Final Exam</td>
<td>100</td>
<td>20</td>
</tr>
<tr>
<td>Written report on group project, and presentation</td>
<td>150</td>
<td>30</td>
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<tr>
<td>Total</td>
<td>500</td>
<td>100%</td>
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- Please read section E, #1 on how to evaluate participation.
- Please read section E, #5 on assignment on individual lab report.
- Please read section E, #3 and #4 on how the written report and presentation will be evaluated.