

Weed Science PEPS/TPSS 481

3 credits (W focus)

Instructor: **Koon-Hui Wang** (koonhui@hawaii.edu)

Lectures: Mon & Wed 8:30 – 9:20 am Gilmore 306

Labs: Wed 1:30 – 4:20 pm (Magoon Teaching and Research Facility, RM 101)

Course Description:

This class aims to 1) increase your knowledge on what weeds are, why they are important and how they interact with our environment; 2) introduce different strategies and methods to manage weeds for different agroecosystems. This course has a writing intensive (W) focus to promote the learning of course materials.

Student Learning Outcomes:

The instructional program in Plant and Environmental Protection Sciences is structured to achieve the following student learning outcomes (SLO):

1. Students will demonstrate understanding of the biology, ecology, and impact of pest and beneficial organisms.
2. Students will demonstrate an understanding of the environment as a complex and changing system.
3. Students will be able to diagnose problems in environmental systems and develop management plans.
4. Students will be able to communicate (oral, written) effectively about plant and environmental protection.
5. Students will demonstrate the ability to collect, manage, present, and critically interpret data and information in an ethical way.

Text: Not required. Readings will be assigned from materials posted online at Laulima. Students are recommended to purchase References 1, 2 and 6. Reference 4 is out of print, but worth securing a used copy.

Office Hours: 9:20-10:30 am after each lecture or by appointment, Office: Gilmore 307.

Reference books:

1. Karen Renner, Christy Sprague. 2005. Integrated Weed Management: One year's seeding. Michigan State University Extension Publication E-2931, East Lansing, MI. 112 pp. <http://www.msuweeds.com/publications/extension-publications/iwm-one-years-seeding-e-2931/>
2. Taylor, E., K. Renner, and C. Sprague. 2005. Integrated Weed Management: Fine Tuning the System. Michigan State University Extension Publication E-3065, East Lansing, MI. 112 pp. <http://www.msuweeds.com/publications/extension-publications/iwm-fine-tuning-the-system-e-3065/>
3. Anderson, W. P. 1996. Weed Science: Principles and Applications. 3rd ed. West Publishing Company, St. Paul, MN.
4. Haselwood, E.L. and G.G. Motter. 1983. Handbook of Hawaiian Weeds. Univ. of Hawaii Press, Harold L. Lyon Arboretum, Honolulu, HI. 491pp. (Laulima: Lab tool)
5. Handbook of Hawaiian Weeds in Flickr -- <http://www.flickr.com/photos/uhmuseum/3403845302/in/set-72157616041949833/>
6. Weeds of Hawaii's Pastures and Natural Areas; An Identification and Management Guide by P. Motooka, L. Castro, D. Nelson, G. Nagai, and L. Ching. ©2003, College of Tropical

Agriculture and Human Resources, University of Hawaii at Manoa.

<http://www.ctahr.hawaii.edu/invweed/weedsHi.html>

7. Weed ID App: <http://m.farmindustrynews.com/blog/new-tool-ids-weeds>.

Lecture Schedule:

Lecture	Date	Topic	Readings (Laulima)	DUE DATE
1	Aug 22	Introduction: Importance of studying weed science	Reading 1	
		Section I: Ecology, biology and Physiology		
2	Aug 24	Weed Biology and Ecology	Reading 2	
3	Aug 29	Weed Threshold: How much weed can we tolerate	Reading 4	Bring in medicinal weeds for 8/31
4	Aug 31	Can weed be useful? Medicinal plant		
	Sep 5	Labor day		
5	Sep 7	Weed seed bank dynamics and its dormancy	Reading 5,6	W1 and W4 Mini-proposal outline due
	Sep 12	Exam I		
		Section II: Weed Management		
6	Sep 14	Introduction to IWM	Reading 7, 8, 9	W2 Students received feedback to mini-proposal outline
7	Sep 19	Physical weed management: Weed prevention (Guest lectured by Extension Agent, Jensen Uyeda)		
8	Sep 21	Cultural practices for weed management		
9	Sep 26	Biological weed management		
10	Sep 28	Organic weed management		
11	Oct 3	Chemical control (classification of herbicide and their mode of actions)		W1 and W4 Turn in learning log related to field trip on Sep 28 lab
12	Oct 5	Chemical control (Herbicide formulation, residual effect, impacts on the environment)		
	Oct 10	Exam II		W2 Student receive feedback on

				learning log
		Section III:		
13	Oct 12	Herbicide behavior in plants: absorption, translocation, mode of actions		W1 and W4 Turn in revised learning log
14	Oct 17	Herbicide Mechanisms of action I		W1 and W4 Class choose GMO debate team
15	Oct 19	Herbicide Mechanisms of action II, Herbicide resistance		
16	Oct 24	Herbicide management (Class debate on controversial issues)		W2 Debate: Pro and cons of HT crops
17	Oct 26	Herbicide management		
18	Oct 31	Know the Law and Regulation of herbicide		W1 and W4 Turn in Debate write up addressing all comments
	Nov 2	Exam III		W2 Receive Debate Summary comments
		Section IV: Weed management in different ecosystems		
19	Nov 7	Weed management in agronomic crops Alternative weed management tactics		W1 and W4 Draft proposal due
20	Nov 9	Weed management in orchard crops		
21	Nov 14	Weed management for landscape nursery and home garden		W2 Student receive comments on proposal draft
22	Nov 16	Weed management for turf (Guest lectured by Dr. Joe Defrank)		
23	Nov 21	Weed management for pasture and rangeland		W1 and W4 Mini-proposal written report due
24	Nov 23	Weed management for forest and natural ecosystems		
25	Nov 28	Weed management for wetlands and riparian zones		W2 Students received feedback on mini-proposal
	Nov 30	Student presentation on mini-proposal I (5 students, 10 min each)		

	Dec 5	Student presentation on mini-proposal II (5 students, 10 min each)		
	Dec 7	Review for Final Exam		
	Dec 12	Final Exam		

Methods of Evaluation:

1. Quiz during every lecture. Quiz will be carried out during every lecture based on student knowledge gain or prior assigned reading materials. Quiz grade is part of student attendance grade.
2. **W3** Debate on “**Pro and cons of herbicide tolerant crops**”. Each student complete a write up on pro or cons of using herbicide tolerant crops before a debate. Students debate about their points of view written, with feedback from the class and instructor, each student then edit their debate write up and submit their final debate argument.
3. **W3** Each student submits a write up to show their learning log or experience from a field trip. They will receive feedbacks in one week. The student then resubmit their learning log addressing the comments they received.
4. **W3** Term project: Each student will write a mini-proposal (Title and Outline of the mini-proposal need to be submitted by Sept 7 to be commented and approved by the instructor). The mini-proposal has to be related to managing weeds, and address how it is relevant to the need of Hawaii. Through literature reviews the student need to justify why this project is needed, how it can be conducted, who will benefit from this proposed project. The student will present a 10-min power point to the class at the end of the semester. Your classmates will serve as the reviewer panel and will be judging the mini-proposals. Around Sept 7, an outline of the proposal along with its title need to be turned in. The students will receive inputs, suggestions and approval from the instructor. On Nov 7, students are encouraged to turn in their mini-proposal draft following the instruction described below. Revision of the mini-proposal will be returned to the student by Nov 14. The student has to turn in the full written proposal to the instructor as well as a one-page abstract of the mini-proposal by **Nov 21** (failure to turn in on time will result in points marks off).
5. Exams (3 mid-term and a final): Written exams will include essay questions (as designated on pg 4).
6. **W3** Debate write up: Each student is required to take a side and turn in a **one page** (single space) point of view on “Pro and Cons of GT crop for Weed Management” before the debate.

Mini Proposal

Each student will be responsible for writing a **10-page** (12 font size, double space) proposal on a weed management related project pertaining to current Hawaii ecosystem. This exercise requires the students to review current scientific literatures on a topic of the student’s choice. Title and outline of the proposal must be submitted for the instructor to approve by **September 7**. The proposal should justify an area in weed science that needs further research in Hawaii and how should this project be carried out. After reviewing the literatures, students should synthesize the literatures and propose a novel research idea. Format of the mini-proposal should include:

1. Justification (30 points) – Briefly introduces the subject, what information is missing, and what do you propose to study, and why is this important.
2. Introduction (30 points) – Present a comprehensive but concise summary of the information available in the literature. Synthesize these information, point out its weaknesses, identifies gaps that need to be addressed.
3. Objectives (10 points) – specifically list out what do you proposed to study in numbered form.
4. Materials and Methods (20 points) – precisely describe how these objectives can be achieved through your study methods.
5. Outcome (20 points) – Describe the expected outcome if the proposal were to be carried out successfully. Who will benefit from this, and how big will the potential impact be?
6. References (10 points) – List all the references cited follow the journal format in Weed Science. They should be accurate and allow others to locate the reference. The vast majority of the references should come from peer reviewed sources.
7. Abstract (5 points) of proposal summarizing 1-6. This will be handed to every student in the class.

Full written mini-proposal and abstract must be turn in to the instructor on Nov 21. Abstract must be distributed to the entire class through Laulima. Please prepare a brief summary of your proposal in power point to be presented to the class within 8 minutes on designated class period.

Grading System:

Description	Points available	% of Grade	% on Writing
Quiz/Participation	10	1.8%	
W3 Debate write up	20	3.6%	3.6%
W3 Learning log from field trip	20	3.6%	3.6%
Exam I	30	5.4%	
Exam II	30	5.4%	
Exam III	30	5.4%	
Final Exam	70	10.9%	
W3 Mini proposal	125	24.5%	22.7%
Presentation	15	2.7%	
W3 Laboratory	200	36.4%	10.9%
Total	550	100%	40.8%

Point Range	Grade
560-504	A
503-448	B
447-392	C
391-336	D
<335	F

Fall 2015 WEED SCIENCE (TPSS/PEPS - 481)
“LABORATORY” Syllabus

Lab	Date	Topic
1	Aug 24	Overview of Weed Science lab: assign weed science teams. Practice using weed id tools-1) download Weed Id book; 2) Weed ID App. Introduce TA, and how to do weed collection for the semester. Introduction to Broad leaf weeds. Look at samples of weed collection. Watch Worker Protection training video (20 min). Tour around Magoon teaching facility and SOFT garden for weed identification. Observe field plots for Experiment I-IV . Weed density monitoring quadrant.
2	Aug 31	Guest Lecture (Joe Defrank) on Cover cropping +“Turn-The-Page” techniques for no-till, non-chemical weed management. Experiment I: Turn-the-page farming – view mulched plots, plant corn seeds into Cone-tainer. Team A will manage data collection on this experiment. Start your weed collection (press dried in phone books). Practice on weed ID.
3	Sep 7	Introduction to grasses and sedge ID. Experiment II: Remove solarization (Sol) mulch, download soil temperature data from data logger. Lay out paper weed mat (PWM), herbicide (Diaquat) on the bare ground (BG) plot. Transplant cabbage seedlings into all plots, fertilize with Sustain fertilizer. Download temperature data. Team B will responsible for most of the data collection from this experiment. Visit weeds in SOFT garden plot. Jeopardy game competition by team (practice for weed ID exam).
4	Sep 14	Experiment I: Uncover turn-the-page weed mat, rototill half of the plot, harvest cover crop mulch and weight cover crop biomass, then transplant corn seedlings. Team B and C check cabbage seedlings in Experiment I, replace transplants if needed. Practice weed ID for Mid Term Exam with Jeopardy game.
5	Sep 21	Lab Mid Term I: Weed ID. Team A check corn seed germination, replace transplants if needed. Team B collect weed data before mulching. Experiment III (1): Team C collect wood chip compost and cover half of the plots of Sol and BG in the cabbage field. Trim sunn hemp to lay on top of the wood chip as additional surface mulch. Generate and maintain at least 4” thick thatch periodically. Experiment IV (1): Team D mark out 1-sq ft quadrant of nutsedge with different stage of growth (vegetative, flowering, flower senescens) to be treated with glyphosate. Apply herbicide using weed wick/Hockey stick on nutsedge plots marked. Continue on your weed collection.
6	Sep 28	Field trip to Poamoho – Experiment IV (2): Observe long-term no-till farming research (No-till/cover cropping with turn-the-page and without turn-the-page method; solarization, bare ground), collect soil for weed seed bank assay (whole class, Team D will be monitoring the weed seed bank data), learn about no-till equipment. Weed suppression by crop types (corn, pumpkin, water melon, onion). Experiment III (2): Observe effect of different selective or pre-emergence herbicides on fruit trees (Team C responsible to manage data).

7	Oct 5	How to read pesticide label. Spray coverage. Video: 1/128 spray calibration method. Team D set up weed seed bank assay trays. Build chicken tractor at Magoon SOFT garden. Team C check mulch thickness. Each team collect weed data from Experiment I-IV. Retake Weed ID exam (optional).
8	Oct 12	Dr. Joe Defrank: Spray equipment: nozzles, pumps and specialized applications systems. Tank mixing, use of spreader sticker. Each team check your experiments. Continue your weed collection/mounting.
9	Oct 19	Guest Lecture (Dr. James Leary): Invasive weed management with herbicide ballistic technology. Each team collect weed data from Experiment I-IV.
10	Oct 26	Sprayer calibration lecture. Collect data for calibration homework.
11	Nov 2	Turn in calibration homework (credit earned), review homework. Whole class collect weed data from each experiment.
12	Nov 9	Lab mid-term: Calibration quiz (45 min). All students harvest head cabbage. Record weight per head from each treatment plots.
13	Nov 16	Turn in weed collection (25 species in 12 families). Harvest corn (ear counts and weight per plot) from each replicated plot.
14	Nov 23	Experiment I: collect weed biomass and corn plant biomass from each replicated plot. Each team share their data sheet in excel format with the instructor, discuss with the instructor on how to conduct simple data analysis. Students in each team discuss about data analysis, prepare power point for team project reports.
15	Nov 30	Continue on student mini-proposal presentation (10 students). Each team meet with instructor to go over results and get feedback on their project. Team assign writing responsibility.
16	Dec 7	Team reports in power point format. Turn in written report of your team (each student in the team is responsible to write 2 pages in the report).
	Dec 14	Final Exam: Written exam (herbicide calibration), Weed id.

Grading System For PEPS 481 Laboratory:

DESCRIPTION	POINTS AVAILABLE	% OF TOTAL GRADE (550)
Weed I.D. mid term	25	4.5%
Calibration homework	20	3.6%
Calibration mid term	20	3.6%
Team project		
a. Oral presentation (team)	15	2.7%
b. W3 Written report	60	10.9%

Weed collection	30	5.4%
Lab final	30	5.4%
Total	200	36.4%

The laboratory projects will be performed outside at the Magoon Greenhouse facility on the Mauka campus. All students will be required to make a weed collection (25 species in 12 families). Please arrange your weed collection by family and have a table of content outline your weed collection by page number.

Students must select a team for their team project (see pg 8) by Aug 24 (first day of lab meeting). Group size will be based on class size (usually no more than 5 per team). Each team will work together to collect data, compile and synthesize data, and each student in the team will split up their responsibility to write up the report (each student has to write **2 pages** of the report with their name clearly identified for the section they wrote). Students in each team must show collaborative effort to write up the full report according to team project report guidelines shown below. Each team member will receive the grade on the 2 pages section they wrote. The entire team will present a 12-minute PowerPoint presentation to summarize the findings and conclusion of their team project, showing team effort. A DropBox folder will be created for the class to share photo throughout the semester for use in power point presentation.

W1 and W4 Lab report guidelines (2 pages/team member, i.e. if they are 5 students in a team, team report should be at least 10-page long)

1. Introduction
 2. Objectives
 3. Materials and Methods
 4. Results
 5. Discussion & Conclusion (see questions listed in project description in your handout)
- (Please clearly identify the 2-pages written by each student)

Team Projects

Team A (Experiment I): “Turn-the-page” farming – with cover crop.

Team B (Experiment II): Solarization, Biodegradable weed mat (paper weed mat), vs Stale seedbed with herbicide (bare ground) technique.

Team C (Experiment III): (1) Thick-thatch mulching at post-plant; (2) Weed control in orchard tree system (pre-emergence herbicide, post-emergence herbicide, mechanical+preemergence).

Team D (Experiment IV): Timing of glyphosate treatment on purple nutsedge, weed seed bank assay comparing no-till with TTP, no-till without TTP, solarization, and bare ground.

Follow the instruction for each Experiment (I to IV) described in Laulima to complete your Lab report as a team. One report and a power point presentation per team are required. Report should be compose of title, objectives, materials and methods (write down the date of each activities),

results (graphs or tables), discussion and conclusion. Total pages of the report will be pending on number of students in the team (2 pages/student).

W3 To receive W focus credits:

	Minimal writing pages	% grade
Lecture	14 pages/student (10 pages on mini-proposal, 2 pages on a debate write up, 2 pages on learning log from a field trip)	29.9% (written assignment + essay questions from exams)
Laboratory	2 pages/student on Lab report for a team project.	10.9% (Lab report)
Total	16 pages	40.8%

Students must adequately complete all writing assignments to pass the course with a D grade or better. Students who do not complete all writing assignments will get a D- or an F and will not earn W Focus credit.