

**UNIVERSITY OF GUAM  
COURSE OUTLINE**

College: College of Natural and Applied Sciences Course Number: AG 101  
Course Title: Introduction to Agriculture Credit Hours: 4  
Date of Final Approval: \_\_\_\_\_ Semester Offered: Fall/Spring  
Course counts as:             X   general education requirement  
   X   part of   Agriculture   major program  
   X   elective

1. Catalog Description:

This course is an introduction to the science of agriculture. This course explains the scientific principles behind the discipline that feeds, shelters, and clothes the world's population. Three hours of lecture and three hours of laboratory. Prerequisite: MA085 or higher.

2. Course Content:

Agriculture is the broad based industry which is engaged in the production of plants and animals for food and fiber. This course introduces the students to a wide range of science studies which have direct application to their everyday lives, lab sessions provide students with hands-on experiences with some of the science topics cover in lectures and to develop observational and writing skills, visits/tours to agriculture facilities on island are included as part of the lab. Topics covered include:

- a. History of agriculture with a time line of agriculture advancements
- b. Soil and plant nutrition
- c. Carbon and Nitrogen Cycles
- d. Plant Reproduction
- e. Plant Pathology
- f. Entomology
- g. Aquaculture
- h. Agriculture animal production
- i. Marketing
- j. Plant Physiology
- k. Genetics and genetic engineering

3. Rationale for the Course:

- a. Introduces students to agriculture science and its history.
- b. Introduces students to the scientific method and general scientific concepts.
- c. Exposes students to basic lab writing skills.
- d. Enables students to interpret current science advances as they relate to food and fiber production.

4. Skills and Background Required or Expected:

Students must have good reading and comprehension skills. There are no prerequisites, but a background in biology, zoology, chemistry and physics is helpful.

5. Teaching Methodologies and Anticipated class size:

A series of lectures dominate class time, a number of different agricultural instructors deliver lectures on specific topics. Lab sessions are intended to provide students with hands-on

experience with some of the methods presented during lectures. Class size from 40 to 50 students. Lab sessions in 2 groups, 20 - 25 each.

6. Learning Objectives for Students:

- Students will be able to articulate the influence of early cultures and geography on agriculture production at the local, national, and international level.
- Students will be able to identify the 20 fields of study and their basic technologies that are behind the production of food and fiber.
- Students will be able to identify 10 common agricultural practices that pose risks to the environment and to society at large.
- Students will conduct and report on a semester long laboratory project that requires the student to collect, organize, analyze, and interpret data.

**Note:** With Program Faculty Consultation, an instructor may add additional SLOs to the above Program Faculty approved SLOs.

7. Methods of Evaluation

The methods of evaluation are written exams, quizzes, lab note books, lab write-ups, and active participation during lab sessions.

8. Methods for Student Learning Outcomes Assessment:

Depending on Instructor and Program Faculty, any one or more of the following may be selected: Pre/Post Test, Course embedded questions; Standardized exams; Portfolio Evaluation; Direct Observation; and Capstone Course Evaluation.

9. Required and Recommended Texts or Study Guides:

Handouts provided by the lecturing instructor; notes taken by the students during lectures.

10. Subsequent Courses:

There are numerous courses that build up on the concepts presented in AG 101. These courses are:

AG 109 The Insect World  
AG 136 Science of Aquaculture  
AG 141 Agricultural mechanics  
AG 181 Principles of Horticultural Crop Production  
AG 211 Principles of Animal Science  
AG 240 Crop Protection  
AG 280 Soil Science  
AG/BI 345 General Entomology  
AG 312 Principles of Animal Nutrition  
AG 323 Plant Pathology

11. Additional Course Descriptors, if any:

Course is intended for students who wish to fulfill General Education Requirements by acquiring additional knowledge in the various fields of agriculture.

# UNIVERSITY OF GUAM COURSE OUTLINE

College: College of Natural and Applied Sciences Course Number: AG 102  
Course Title: Plant Biology Credit Hours: 4  
Date of Final Approval: \_\_\_\_\_ Semester Offered: Fall/Spring  
Course counts as:   X   general education requirement  
  X   part of   Agriculture   major program  
\_\_\_\_\_ elective

## 1. Catalog Description:

This course is an introduction to the study of living plants and their relationship to the environment. Topics include plant cells, tissues, growth, reproduction, metabolism, genetics, classification, and evolution. The course focuses on the impact of light, temperature, soil and other environmental components on plant growth. Lab experiments will illustrate basic principles of plant biology. It includes 3 hours of lecture and 3 hours of lab weekly. Prerequisites: MA085 or higher.

## 2. Course Content:

The course introduces basic principles of plant science. The topics of plant biology include plant cells, tissues, organs, growth, reproduction, metabolism, genetics, classification and evaluation. It focuses environmental factors influencing the plant growth. Environmental factors include light, temperature, water, and soil. Lab experiments will illustrate basic principles of plant biology. The course meets for three hours lecture and three hours laboratory weekly. Student must take both lecture and laboratory concurrently.

Topics covered are:

- Nature of life Plant reproduction and
- Plant cells, tissues, organs
- Roots, stems, leaves, flowers, fruits, seeds
- Plant physiology and morphogenesis
- Plant metabolism and growth
- Plant reproduction and propagation
- Plant improvement: genetics and biotechnology
- Plant evolution
- Plant classification
- Plants and environments

## 3. Rationale for the Course:

There are no plant biology courses being offered at the University of Guam. Tropical Agriculture and Environmental Science Program offers several upper division courses of horticulture science and plant pathology courses that requires for students to know basic principles of plant science prior to taking those upper division courses. This course will be a core requirement for Agricultural Science major and a prerequisite for Agriculture upper division classes. Students learn the overview of the basic concept of plant science to fulfill the general education science requirement.

4. Skills and Background Required or Expected:

Prerequisites: MA085 or higher and AG101 or BI100 or BI157 or BI158.

5. Teaching Methodologies and Anticipated class size:

Basic concepts of plant biology will be presented during lecture. Student will observe and learn scientific methods to understand plant biology in laboratory.

6. Learning Objectives for Students:

- Describe how and why all life is dependent on green organisms.
- Explain how humans have impacted their environment.
- Explain briefly what the scientific method is.
- Explain the nature of compounds, acids, bases and salts.
- Identify and describe the structure and function of plant cells, organelles, tissues and organs.
- Describe the functions of root, stems, leaves flowers, fruits and seeds.
- Describe the differences between photosynthesis and respiration.
- Diagram and describe the phases of meiosis and mitosis.
- Describe the structure and functions of DNA.
- Distinguish between phenotype and genotype.

**Note:** With Program Faculty Consultation, an instructor may add additional SLOs to the above Program Faculty approved SLOs.

7. Methods of Evaluation

Exams, active class and laboratory participation, oral and written reports

8. Methods for Student Learning Outcomes Assessment:

Depending on Instructor and Program Faculty, any one or more of the following may be selected: Pre/Post Test, Course embedded questions; Standardized exams; Portfolio Evaluation; Direct Observation; and Capstone Course Evaluation.

9. Required and Recommended Texts or Study Guides:

Stern, Kingsley R. 2000. Introductory Plant Biology, latest edition. McGraw-Hill. Higher Education. (ISBN 0-07-012205-9)

10. Subsequent Courses:

AG 323 Plant Pathology or AG423 Advanced Plant Pathology or AG425 Plant Diagnostics, AG340 Crop Protection

11. Additional Course Descriptors, if any:

None

The Calendar of Assignments, Assessment Project, a Statement Concerning the "Americans with Disabilities Act" (ADA) Accommodations for Students, Attendance and Grading Policies are to be included in the course syllabus.

**UNIVERSITY OF GUAM  
COURSE OUTLINE**

College: College of Natural and Applied Sciences Course Number: AG 109

Course Title: The Insect World Credit Hours: 4

Date of Final Approval: \_\_\_\_\_ Semester Offered: Fall Odd

Course counts as:              X   general education requirement  
              part of   Agriculture   major program  
     X   elective

1. Catalog Description:

This course is an overview of insect biology for non- scientists. Emphasis is on insect behavior, ecology and structural/ morphological adaptations. Lab is geared toward identifying common insects and experimentally examining aspects of insect biology. The course may be used as an AG elective, but will not serve to replace AG course. Three hours of lecture and three hours of laboratory weekly. Prerequisite: MA085 or higher.

2. Course Content:

Insects comprise more than half of all known species and are critically important to the functioning of terrestrial ecosystems. As pollinators, vectors of diseases and agricultural pests, they have an important direct impact on the lives of humans. Insects also share many biological features with more complex organisms and can be used as models for understanding much of biology. Thus they serve as a general introduction to many wider themes in biology and ecology. Topics covered are:

- A. Animals with external skeletons, internal and external anatomy of insects,
- B. Growth and development of insects, diversity and classification of insects,
- C. Nervous systems and sensory structures, basic behaviors,
- D. Communication of insects with the world around them, courtship, copulation and oviposition
- E. Herbivores, predators, parasites and blood suckers
- F. Insect societies: parental care and pre-social behavior and social insects
- G. Plant insect interactions: Pollination and interactions: Herbivores
- H. Populations growth and containment: general principles
- I. Insects and their predators, insects as scavengers and decomposers, insects adapting to their physical environment, insects as vectors of plant and animal disease, insect borne disease and human history, insects as pests of agriculture
- J. Pesticides and their side effects, biological control and other non-pesticide controls, and
- K. Eating insects and other human uses of insects

3. Rationale for the Course:

- A. Introduces students to the science of entomology.
- B. Introduces students to the scientific method and general scientific concepts.
- C. Exposes students to basic technical writing skills.

4. Skills and Background Required or Expected:

High school biology.

5. Teaching Methodologies and Anticipated class size:

Lecture portion will be primarily presented as lectures, with possible occasional use of videos. About half of the laboratory sessions will consist in part of short lecture followed by hands-on examination of specimens by students. The rest of the laboratories will be experiments to be performed by the students followed by discussion and write up.

Anticipated class size is 20 up to no more than 25.

6. Learning Objectives for Students:

- Students will be able to identify the importance of insects' role in the world to the functioning of the terrestrial ecosystems.
- Students will be able explain how insects deal with the world around them.
- Students will be able to use insects as examples to apply concepts and comparisons with other organisms.
- Students will explore experimental techniques, learn technical writing skills, will be given hands on experience to ideas or material presented in lecture, and develop critical thinking.
- Students will be able to identify insects to the level order.

**Note:** With Program Faculty Consultation, an instructor may add additional SLOs to the above Program Faculty approved SLOs.

7. Methods of Evaluation

The methods of examinations are:

Quizzes, including lab quizzes, lecture and reading cards, research project or term paper, personal experience with arthropods project and four laboratory reports.

8. Methods for Student Learning Outcomes Assessment:

Depending on Instructor and Program Faculty, any one or more of the following may be selected: Pre/Post Test, Course embedded questions; Standardized exams; Portfolio Evaluation; Direct Observation; and Capstone Course Evaluation.

9. Required and Recommended Texts or Study Guides:

None. Chapters of various books and magazines articles on reserve in library.

10. Subsequent Courses:

AG 240	Crop Protection
AG 280	Principles of Soil Science
AG 323	Plant Pathology
AG/BI 345	General Entomology
AG 423	Advanced Plant Pathology

11. Additional Course Descriptors, if any:

None

The Calendar of Assignments, Assessment Project, a Statement Concerning the "Americans with Disabilities Act" (ADA) Accommodations for Students, Attendance and Grading Policies are to be included in the course syllabus.

**UNIVERSITY OF GUAM  
COURSE OUTLINE**

College: College of Natural and Applied Sciences Course Number: AG 136  
Course Title: Science of Aquaculture Credit Hours: 4  
Date of Final Approval: \_\_\_\_\_ Semester Offered: Fall/Spring  
Course counts as:   X   general education requirement  
  X   part of   Agriculture   major program  
\_\_\_\_\_ elective

\*Currently a required course for the Applied Emphasis of the Agriculture Degree Program

1. Catalog Description:

This course is designed to introduce students to the science of aquaculture. Lectures focus on the history, theory and description of aquaculture systems around the world. Laboratories allow students hands-on experience with field testing of water quality; field identification of fish, crustaceans, aquatic plants, and parasites; reproduction of certain aquaculture species; and other cultural practices. Three hours lecture and three hours laboratory weekly. Prerequisite: MA085 or higher.

2. Course Content:

- A. History of aquaculture,
- B. Culture systems,
- C. Ecology of ponds, fertilization and water quality,
- D. Economics of aquaculture, marketing of aquaculture products,
- E. Feeds and nutrition,
- F. Physiology of organisms, reproduction, diseases, larval culture, grow-out methods,
- G. Harvesting, processing and quality control,
- H. Integrated systems, species introductions,
- I. Aquaculture and the environment.

3. Rationale for the Course:

The interest in aquaculture has been evident in the private business sector for many years. The shortage of trained personnel to staff the facilities and increasing interest in the field by students were primary in developing the course.

4. Skills and Background Required or Expected:

This is an introductory level course examining the field of aquaculture and initiating students to the aspects of science needed to enter the field. No previous skills or background needed, just a willingness to learn.

5. Teaching Methodologies and Anticipated class size:

Teaching methods will incorporate participatory discussions, video presentations, slide and other multi-media during lecture and laboratory sessions. Additional hands-on activities in laboratory will include working on small fish culture systems (aquariums, pools, tanks, etc.), artificial spawning of fish, integrated systems, chemical analysis of water quality, examination of physiology of fish, processing and quality control of aquaculture products.

6. Learning Objectives for Students:

- Demonstrate an understanding of history, impact, current status and future trend of aquaculture.
- Demonstrate an understanding of anatomy and physiology of fish.
- Develop working knowledge of major components in aquaculture development.
- Establish hand-on experience in aquaculture practices: water quality monitor and sampling, as well as data collection and interpretation in aquaculture system.
- Identify the species and describe the systems commonly used in Guam Aquaculture.
- Identify disease and environmental/water quality constraints to productions.

**Note:** With Program Faculty Consultation, an instructor may add additional SLOs to the above Program Faculty approved SLOs.

7. Methods of Evaluation

Student will be evaluated with a mid-term and final written examination. Two or more quizzes/exams and a term paper or group project on an aquaculture related topic. Laboratories will be evaluated with reports for each laboratory session and two laboratory practical examinations.

8. Methods for Student Learning Outcomes Assessment:

Depending on Instructor and Program Faculty, any one or more of the following may be selected: Pre/Post Test, Course embedded questions; Standardized exams; Portfolio Evaluation; Direct Observation; and Capstone Course Evaluation.

9. Required and Recommended Texts or Study Guides:

Aquaculture: Principles and Practices. T.V.P. Pillay, Blackwell Publishing Ltd., Latest edition. Students will also be responsible for reading text handouts, and assigned readings at the RFK Library.

10. Subsequent Courses:

None

11. Additional Course Descriptors, if any:

Fish culture, mariculture, integrated aquaculture.

The Calendar of Assignments, Assessment Project, a Statement Concerning the "Americans with Disabilities Act" (ADA) Accommodations for Students, Attendance and Grading Policies are to be included in the course syllabus.



**UNIVERSITY OF GUAM  
COURSE OUTLINE**

College: College of Natural and Applied Sciences Course Number: AG 211

Course Title: Principles of Animal Sciences Credit Hours: 4

Date of Final Approval: \_\_\_\_\_ Semester Offered: Fall

Course counts as:

<u>    X    </u>	general education requirement
<u>    X    </u>	part of <u>    Agriculture    </u> major program
<u>    X    </u>	elective

1. Catalog Description:

This course covers adaptation, distribution and numbers of livestock throughout the world; significance and economic importance; trends in livestock production; introduction to feeding, breeding, disease control, growth, and physiology. Three hours of lecture and three hours of laboratory weekly. Prerequisite: MA085 or higher BI157-157L (BI157-157L and BI158-158L preferred)

2. Course Content:

There is hardly any sphere of human life not directly or indirectly impacted by animals or their products. To name a few: Food, leather, wool, life saving pharmaceutical products, transportation, fuel, fertilizer and companionship. The following topics will be covered in this course:

- A. Scope and Future of Animal Agriculture
- B. Animal Products
- C. Common Terminology in Animal Science
- D. Animal Improvement (Animal Breeds, Breeding & Selection)
- E. Anatomy and Physiology of Farm Animals
- F. Reproduction of Farm Animals (Egg Production, Lactation, Growth & Body Composition)
- G. Animal Nutrition, (Digestion, Metabolism)
- H. Animal Management (Beef, Swine, Dairy, Poultry)
- I. Disease Control
- J. Animal Behavior
- K. Case and Humane Treatment of Laboratory Animals

3. Rationale for the Course:

- A. The course is an introduction of the study of animals.
- B. It is designed to present an integrated view of farm animals (animal contribution, distribution, ecological and economic importance).
- C. It develops an understanding and appreciation of the many field of animal science.
- D. Introduces students to the general scientific concepts and methodology.

4. Skills and Background Required or Expected:

MA085 or higher BI157-157L (BI157-157L and BI158-158L preferred)

5. Teaching Methodologies and Anticipated class size:

Lectures will be presented with occasional use of video tapes and computer assisted instructions on special topics. Open discussions and active involvement and participation by the students will be emphasized. Students will be treated as the main players while the instructor

will play its role as a facilitator, laboratory sessions will consist of short lectures, video presentations, small animal dissection, field trips and farm visits. Students will be exposed to animal handling, some laboratory techniques, laboratory safety measures and computer assisted feed formulations. Class size can vary from 3 to 25.

6. Learning Objectives for Students:

- Student will describe major commercial breeds of livestock and poultry.
- Student will demonstrate animal husbandry skills.
- Student will demonstrate an integrated view of farm animals (animal contribution, distribution, ecological and economic importance).
- Student will describe general scientific concepts and methodology.

**Note:** With Program Faculty Consultation, an instructor may add additional SLOs to the above Program Faculty approved SLOs.

7. Methods of Evaluation

The methods of evaluation include midterm and final exams, pop quizzes, class participation and attendance, laboratory reports and a term paper.

8. Methods for Student Learning Outcomes Assessment:

Depending on Instructor and Program Faculty, any one or more of the following may be selected: Pre/Post Test, Course embedded questions; Standardized exams; Portfolio Evaluation; Direct Observation; and Capstone Course Evaluation.

9. Required and Recommended Texts or Study Guides:

There is no required textbook for this class. Pertinent material will be given as handouts. Instructor will make all instructional video tapes and computer based programs available to the students. Readings will be assigned from current topics in professional journals and the following references:

- A. The Science of Animals that Serve Mankind, by Campbell and Lasley.
- B. Anatomy and Physiology of Farm Animals, by R.D. Frandson.
- C. Animal Agriculture: Research to Meet Human Needs in the 21st Century, by Pond et al.
- D. Animal Agriculture: The Biology, Husbandry, and Use of Domestic Animals, by Cole & Garret, Editors.

10. Subsequent Courses:

This course will prepare students for upper division Animal Science courses if offered.

11. Additional Course Descriptors, if any:

The Calendar of Assignments, Assessment Project, a Statement Concerning the "Americans with Disabilities Act" (ADA) Accommodations for Students, Attendance and Grading Policies are to be included in the course syllabus.

**UNIVERSITY OF GUAM  
COURSE OUTLINE**

College: College of Natural and Applied Sciences Course Number: AG 281  
Course Title: Principles of Horticulture Science Credit Hours: 4  
Date of Final Approval: \_\_\_\_\_ Semester Offered: Spring  
Course counts as: \_\_\_\_\_ general education requirement  
                                    X   part of   Agriculture   major program  
                                  \_\_\_\_\_ elective

1. Catalog Description:

This course introduces principles of plant-soil-climate relations and physical characteristics in horticultural crop production, current practices included. Emphasis is on the practical aspects of producing vegetable, fruit and ornamental crops in the tropics. Three hours of lecture and three hours lab weekly. Prerequisite: MA110 or higher and AG102 or BI157 or BI158.

2. Course Content:

This course will provide students the basic knowledge of horticultural science and technology. Horticulture science will include plant classification, structure, growth, metabolism, differentiation, development, reproduction, and plant growth response to environmental factors such as soil, water, light, and temperature. Horticultural technology will describe various horticultural practices and crop management used in growing horticultural plants, including propagation, mineral nutrition, training and pruning, growth regulation, plant protection, breeding and marketing. Economically and culturally important crops on Guam and other tropical regions will be emphasized.

3. Rationale for the Course:

The course is the basic horticulture science and technology course for all students in the field of general agriculture, general horticulture, ornamental horticulture, tropical fruits horticulture, tropical vegetable horticulture, turf management, plant nursery management, landscape management, extension horticulture, secondary education in plant sciences, agribusiness, environment science, conservation, ethnobotany, and horticulture therapy. This course is a foundation of all upper horticulture and related agriculture courses. It is a required course for all majors in Agriculture Degree and Agriculture Secondary Education Degree.

4. Skills and Background Required or Expected:

Prerequisite: MA110 or higher and AG102 or BI157 or BI158.

5. Teaching Methodologies and Anticipated class size:

Format of the course is a series of lectures with a weekly laboratory. Students will have opportunity to visit sites of crop production and research experiment fields. Students will also conduct group projects of plant science experiments or demonstrations. Written and/or oral presentation of projects is required. Anticipated class size: 10 to 15 students.

6. Learning Objectives for Students:

- Student will describe botanical and horticultural classification of plants.
- Student will demonstrate horticultural skills of plant propagation.

- Student will demonstrate horticultural skills of general garden plant care including pruning, irrigation, and fertilizer application and plant diagnostics.
- Student will describe scientific names, origin, economic/cultural uses, plant improvement methods, and post-harvest handling of at least three important plants in horticulture.
- Student will describe how horticulturists can modify environmental factors affecting plant growth in order to produce superior agricultural crops.

**Note:** With Program Faculty Consultation, an instructor may add additional SLOs to the above Program Faculty approved SLOs.

7. Methods of Evaluation

The methods of evaluation are written exams, quizzes, and laboratory reports, and attendance.

8. Methods for Student Learning Outcomes Assessment:

Depending on Instructor and Program Faculty, any one or more of the following may be selected: Pre/Post Test, Course embedded questions; Standardized exams; Portfolio Evaluation; Direct Observation; and Capstone Course Evaluation.

9. Required and Recommended Texts or Study Guides:

*Horticulture: Principles and Practices* by George Acquab. Latest Edition. Prentice Hall, Inc.

10. Subsequent Courses:

AG 340	CROP PROTECTION
AG 323	PLANT PATHOLOGY
AG 484	ADVANCED VEGETABLE AND FIELD CROP PRODUCTION
AG 485	TROPICAL FRUITS HORTICULTURE
AG 486	ORNAMENTAL CROP PRODUCTION IN THE TROPICS

11. Additional Course Descriptors, if any:

The course will demonstrate the basic plant science and technology with the emphasis on tropical horticulture important to the western Pacific islands. Current environmental and social issues as well as cultural practices will be presented to understand the important principles of environmental horticulture and agriculture.

The Calendar of Assignments, Assessment Project, a Statement Concerning the "Americans with Disabilities Act" (ADA) Accommodations for Students, Attendance and Grading Policies are to be included in the course syllabus.

**UNIVERSITY OF GUAM  
COURSE OUTLINE**

College: College of Natural and Applied Sciences Course Number: AG 321  
Course Title: Horticulture Plant ID Credit Hours: 2  
Date of Final Approval: \_\_\_\_\_ Semester Offered: Fall Even Years  
Course counts as: \_\_\_\_\_ general education requirement  
                                    X   part of   Agriculture   major program  
                                  \_\_\_\_\_ elective

1. Catalog Description:

This course is designed for students who would like to identify the plants that are important to Guam's culture, economy, and environment. This course will introduce the subject of higher plant nomenclature and provide practical experience in plant identification of fruits, vegetable, weeds, and ornamental plants. One hour of lecture and three hours of laboratory weekly.  
Prerequisite: AG102 or consent of instructor.

2. Course Content:

This course will introduce nomenclature of plants which are important to Guam's culture, economy and environment. Basic botanical terms used in plant classification system will be introduced. Live specimens and herbarium of different groups of plants will be presented in each class. Students will be able to recognize plant morphology and the principal characteristics of each plant.

3. Rationale for the Course:

Recognition of plant names and their importance on Guam will aid students to gain knowledge in plant biology, agricultural science, environmental science, and ethonobotany.

4. Skills and Background Required or Expected:

Prerequisite: AG 102 or consent of instructor.

5. Teaching Methodologies and Anticipated class size:

One hour lecture and two hour laboratory will be offered weekly with presentation of 15-20 plants, including live and herbarium specimen, and description of each plant. Class size: 15-20 students.

6. Learning Objectives for Students:

Students will be able to:

- Identify up to 150 different species of plants used or that are important to Guam's culture, economy and environment.
- Differentiate among different leaf, floral and fruiting structures used to identify trees, shrubs, and herbaceous plants.
- Select appropriate fruits, vegetables, and ornamental plants for use in Guam.
- Apply the binomial nomenclature system to name plants found in the landscape.
- Apply the basics of plant classification to fruits, vegetables, weeds and ornamental plants found in Guam.
- Construct a plant specimen reference collection using pressed plant specimens and/or photographs collected by the student.

**Note:** With Program Faculty Consultation, an instructor may add additional SLOs to the above Program Faculty approved SLOs.

7. Methods of Evaluation

Exams and submission of botanical illustrations.

Course Requirements: Taking exams, submit botanical illustrations from each class.

Evaluation: Exam #1	100
Exam #2 1	100
Final Exam	200
Submission of 20 botanical illustrations	100
Grades:	A = 90 - 100%
	B = 80 - 89%
	C = 70 - 79%
	D = 60 - 69%
	F = below 60%

8. Methods for Student Learning Outcomes Assessment:

Depending on Instructor and Program Faculty, any one or more of the following may be selected: Pre/Post Test, Course embedded questions; Standardized exams; Portfolio Evaluation; Direct Observation; and Capstone Course Evaluation.

9. Required and Recommended Texts or Study Guides:

Recommended references are:

1. Raulerson L. and A. Rinehart. 1991. Trees and Shrubs of the Northern Mariana Islands. Coastal Resources Management, Office of the Governor, Commonwealth of the Northern Mariana Islands, Saipan, Northern Mariana Islands 96950. 120 pp.
2. Moore P.H. and P.D. McMakin. 1979. Plants on Guam: I Tinanom Guahan Siha. University of Guam, College of Agriculture and Life Sciences Cooperative Extension Service. 186 pp. (Also available in internet)
3. Moore P.H. and R.D. Krizman. 1981. Field and Garden Plants of Guam: Tinanom Kana yan Hatdin Siha Giya Guahan. University of Guam, College of Agriculture and Life Sciences Cooperative Extension Service, 183 pp.

10. Subsequent Courses:

11. Additional Course Descriptors, if any:

This course introduces basic botanical terms to describe plant species and family, emphasizing their importance in life on Guam.

The Calendar of Assignments, Assessment Project, a Statement Concerning the "Americans with Disabilities Act" (ADA) Accommodations for Students, Attendance and Grading Policies are to be included in the course syllabus.

**UNIVERSITY OF GUAM  
COURSE OUTLINE**

College: College of Natural and Applied Sciences Course Number: AG 340

Course Title: Pest Management Credit Hours: 4

Date of Final Approval: \_\_\_\_\_ Semester Offered: Spring Even Years

Course counts as: \_\_\_\_\_ general education requirement  
                                     X   part of   Agriculture   major program  
                                   \_\_\_\_\_ elective

1. Catalog Description:

A capstone agriculture course that draws from the student’s experience in soil science, horticulture, biology, entomology, and plant pathology to introduce the student to common agricultural pests (insects, plant pathogens and weeds) and their management. As part of the lecture portion of the course, students will be expected to pass the University of Guam Private Pesticide Applicators course and the Nation Plant Diagnostic Network (NPDN) First Detector Course. Laboratory portion of the course will include field trips, exercises in the Cooperative Extension Service Plant Diagnostic Clinic and lab work in pest identification and pest control pests. Three-hours of lecture and three-hours of laboratory weekly. This is a required course for Agriculture Science major Applied Emphasis and an upper elective for Research emphasis. Prerequisite: AG 281. Suggested courses but not required biology, entomology, plant pathology, plant ID.

2. Course Content:

Pest management is the science of preventing, suppressing, or eradicating biological organisms that are causing a problem. Pest management practices may be classified according to the *approach* or the *method* used to deal with a pest problem. In terms of approach, pest management practices may be designed to (1) prevent a problem, (2) suppress a problem, or (3) eradicate a problem. In regard to method, pest management practices may be classified in a number of categories of which the most common are (1) chemical, (2) cultural and mechanical, (3) biological, and (4) legal.

The concepts of “*Integrated Pest Management*” (IPM) will be emphasized in this course as a preferred approach to controlling pests. This management strategy takes into consideration the ecology of the environment and all relevant interactions that pest management practices may have upon the environment in which one or more pest problems may exist. When IPM principles are applied to a given pest problem, it is generally assumed that environmental impact and economic risks have been minimized. Since IPM considers all applicable methods, it is also assumed that emphasis on chemical methods may be reduced when effective non-chemical alternative methods are available. As a result, implementation of IPM principles and practices is advocated in various federal and state regulations affecting pesticides. Section 11(c) of FIFRA specifically advocates that IPM techniques be included in training of certified applicators of restricted use pesticides.

Topics covered are:

Definitions and brief history: ecological foundations  
Arthropods: basic anatomy of insects, insect life cycle, site specific insects  
Rodent and other pests  
Weed science: Weed identification and Weed Ecology  
Brief History of Plant Pathology  
Plant Diseases: Disorders, Symptoms, Bacteria, Mycoplasmas, Fungi, Viruses and Nematodes  
Integrated Pest Management: Effect on Yield  
Control: Cultural, Physical Control, Biological Control  
Pesticide: Formulations, Application, Calibration Methods, Safely, Poisoning, Ecosystem and Laws

3. Rationale for the Course:

This is the foundation course for all agriculture elective courses dealing with plant science.

4. Skills and Background Required or Expected:

This is a required course for Agriculture Science major Applied Emphasis and an upper elective for Research emphasis. Prerequisite: AG 281. Suggested courses but not required biology, entomology, plant pathology, plant ID.

5. Teaching Methodologies and Anticipated class size:

Students will be taught using lectures and laboratory exercises. The anticipated class size is from 3 to 6 students.

6. Learning Objectives for Students:

- Students will be able to label a total of 50 anatomical parts of insects, weeds, and fungi.
- Students will be able to draw and label life cycles of three insects, four weeds, and one each of the following plant diseases: imperfect fungi, bacteria, and viruses.
- Students will be able to develop control strategies for 20 of Guam's most common pests incorporating cultural, physical and chemical methods.
- Student will be expected to pass the University of Guam Private Pesticide Applicators course and the Nation Plant Diagnostic Network (NPDN) First Detector Course.

7. Methods of Evaluation

Exams, class and laboratory participation, oral and written reports

8. Methods for Student Learning Outcomes Assessment:

Depending on Instructor and Program Faculty, any one or more of the following may be selected: Pre/Post Test, Course embedded questions; Standardized exams; Portfolio Evaluation; Direct Observation; and Capstone Course Evaluation.

9. Required and Recommended Texts or Study Guides:

CPPI-Crop Protection for Pacific Islands an ADAP publication 94-5  
GCG-Guam Cucurbit Guide a UOG, CES publication  
EPT-Eggplant, Pepper, and Tomato Production Guide for Guam UOG, CES publication  
DCC-Diseases of Cultivated Crops in Pacific Island Countries a South Pacific Corn. pub  
ACW-Color Atlas of Common Weeds of Guam a UOG AES publication

10. Subsequent Courses:

None



11. Additional Course Descriptors, if any:  
**None**

The Calendar of Assignments, Assessment Project, a Statement Concerning the “Americans with Disabilities Act” (ADA) Accommodations for Students, Attendance and Grading Policies are to be included in the course syllabus.

**UNIVERSITY OF GUAM  
COURSE OUTLINE**

College: College of Natural and Applied Sciences Course Number: AG 342  
Course Title: Principles of Agricultural Engineering Credit Hours: 3  
Date of Final Approval: \_\_\_\_\_ Semester Offered: Spring  
Course counts as: \_\_\_\_\_ general education requirement  
  X part of Agriculture major program  
  \_\_\_\_\_ elective

1. Catalog Description:

This course is an introduction to engineering principles in agriculture with emphasis on land measurements, farm power and machinery, farm structures, farm electrification and farm water management. This course consists of three hours of lecture and three hours of laboratory weekly. Prerequisite: MA161a or higher.

2. Course Content:

Introduction to surveying, grading, and earthwork calculations. Principles of farm power and machinery. Various types of engines, harvesting equipment, plows, disc harrows, power sprayers,...etc. Principles of farm structures and farm electrification. Types of structures, governing design principles for animal housing and storage structures. Electrical requirements of farm equipment. Single phase and three phase power supply. Principles of farm water management. Types of irrigation systems, water requirements of crops and animals. Microirrigation systems, their operation and maintenance.

3. Rationale for the Course:

This core course for agriculture majors introduces to them some basic agricultural engineering principles. Agriculture involves land measurements, farm equipment, and animal housing, storage, electricity and water. Students are exposed to these aspects of agriculture to help them prepare for their future jobs as farm managers, researchers or consultants etc.

4. Skills and Background Required or Expected:

Students must have a good mathematics background. They must have completed MA 161 or concurrently enrolled into it. AG 141 is helpful but not required. It is recommended that students complete lower level agricultural courses before registering for this course.

5. Teaching Methodologies and Anticipated class size:

Class lecture, lecture-discussion, slides, pictures, models/actual equipment is used in teaching. Students participate in equipment operation and demonstration projects. Basic emphasis is given on basic principles and how to apply these under different circumstances. Class size will vary depending upon the number of agriculture majors graduating in a particular year. Based on past experience it may vary from 1 to 5 students.

6. Learning Objectives for Students:

Students will be able to:

- Carry out three types of leveling surveys - differential leveling, profile leveling, and topographic leveling.
- List and describe various irrigation methods, microirrigation system parts, operation, and

maintenance of drip irrigation systems.

- Calculate irrigation water requirement and irrigation schedules of agricultural crops.
- Demonstrate knowledge of the principles of operation of internal Combustion engines, work, energy, power, power trains and speed reduction gears.
- Calculate heat load and ventilation requirements for animal structures and housing.

**Note:** With Program Faculty Consultation, an instructor may add additional SLOs to the above Program Faculty approved SLOs.

7. Methods of Evaluation

The methods of evaluation include written examinations, quizzes, homework, and class participation.

8. Methods for Student Learning Outcomes Assessment:

Depending on Instructor and Program Faculty, any one or more of the following may be selected: Pre/Post Test, Course embedded questions; Standardized exams; Portfolio Evaluation; Direct Observation; and Capstone Course Evaluation.

9. Required and Recommended Texts or Study Guides:

Handouts provided by the instructor and notes taken by the students during lectures.

10. Subsequent Courses:

N/A

11. Additional Course Descriptors, if any:

Prerequisite: MA161a or concurrent enrollment. This is a core course for agricultural major students. Efforts are made to provide hands on experience with actual equipment and models during lectures and projects to account for the multicultural reality of the university.

The Calendar of Assignments, Assessment Project, a Statement Concerning the "Americans with Disabilities Act" (ADA) Accommodations for Students, Attendance and Grading Policies are to be included in the course syllabus.

**UNIVERSITY OF GUAM  
COURSE OUTLINE**

College: College of Natural and Applied Sciences Course Number: AG/BI 345  
Course Title: General Entomology Credit Hours: 4  
Date of Final Approval: \_\_\_\_\_ Semester Offered: Fall Odd Years  
Course counts as: \_\_\_\_\_ general education requirement  
X part of Agriculture major program  
X elective

1. Catalog Description:

This course is an overview of insect biology with emphasis on fundamental problems encountered by insects, and the structural and functional adaptations used to overcome these problems. The laboratory focuses on insect identification. An insect collection is required. The course meets for three hours of lecture weekly. Prerequisites: BI157-157L or AG109 or AG281.

2. Course Content:

This course provides students with basic biological information relating to arthropods in general and insects specifically. Topics include systematic, morphology, physiology, behavior and ecology of insects. Insect pest management is also covered, as are techniques for collecting, preserving, and identifying insects. Entomology resources on the internet are also examined. Insects on Guam are emphasized through the preparation of an insect collection with identification to the family level required. Use of computers in internet access, data analysis, and report writing is emphasized.

3. Rationale for the Course:

The course is an elective upper division entomology course for all majors in the Agriculture Degree and Agriculture Secondary Education Degree in the College of Agriculture and Life Sciences, and for biology majors in the College of Arts and Sciences. Insects constitute a major component of the world's biotic community. Insects found in the Western Pacific region are diverse and many are unique in the world. Others have been imported inadvertently over the years and have established stable populations. Some of the endemic and introduced insects are serious economic pests, competing with man for food and fiber. The study of insects has long been a cornerstone of biology.

4. Skills and Background Required or Expected:

Prerequisite courses are BI157-157L, or AG 109, or AG 281. The student should be well versed in basic biology, and possess strong reading and writing skills.

5. Teaching Methodologies and Anticipated class size:

Most information will be presented as lectures in the classroom. The weekly laboratory reinforces concepts introduced in the lecture. A major component of the laboratory course is the preparation an insect collection which allows students to gain hands-on experience with insects in the real world. Using dichotomous keys they will learn to identify insects they themselves have collected to the family level, allowing them 10 assimilate practical knowledge on insect biology and ecology. Several collecting field trips will be held during the course of the semester to areas representative of Guam's diverse habitats. A written paper on some topic

of entomology is also required. Computers will be used to research and analyze data, and prepare the paper. The paper is written in scientific format incorporated by current entomological publications. Guest lecturers will be invited as available from local government agencies and private companies with experience in various aspects of entomology, including medical entomology, plant health and quarantine, plant inspection, and commercial pest control. Anticipated class size is 20 students.

6. Learning Objectives for Students:

- The student will be able to identify insects on Guam to the family level.
- The student will be able to describe the basic biology and ecology of the insect orders, and of the most important families within those orders.
- The student will be able to identify and describe the function of external and internal anatomical features of the various insect orders.
- The student will be able to write a research paper on an entomological topic using college level English and following formats acceptable for current professional scientific journals.
- The student will be able to prepare an insect collection using acceptable museum-acceptable preservation and mounting procedures.

**Note:** With Program Faculty Consultation, an instructor may add additional SLOs to the above Program Faculty approved SLOs.

7. Methods of Evaluation

Student performance will be evaluated by written exams and quizzes, insect ID quizzes, term papers, and preparation of an insect collection.

8. Methods for Student Learning Outcomes Assessment:

Depending on Instructor and Program Faculty, any one or more of the following may be selected: Pre/Post Test, Course embedded questions; Standardized exams; Portfolio Evaluation; Direct Observation; and Capstone Course Evaluation.

9. Required and Recommended Texts or Study Guides:

Borror, D.J., C. A. Triplehorn, and N.F. Johnson. Latest Edition. An Introduction to the Study of Insects, Saunders College Publishing, San Francisco. 875 pp.

Lobban, C.5. and M. Schefter. 1993. Successful Lab Reports. Cambridge University Press. New York. 106 pp.

10. Subsequent Courses:

This is an elective upper division course.

11. Additional Course Descriptors, if any:

Current information will be obtained through recent entomological journals and through the internet. Laboratory facilities for rearing, collecting, preserving, and identifying insects will be made available.

**UNIVERSITY OF GUAM  
COURSE OUTLINE**

College: College of Natural and Applied Sciences Course Number: AG/NS 380

Course Title: Principles of Soil Science Credit Hours: 4

Date of Final Approval: \_\_\_\_\_ Semester Offered: Spring Even

Course counts as:              X   general education requirement  
                                       X   part of   Agriculture   major program  
                                     \_\_\_\_\_ elective

1. Catalog Description:

This course delves into the basic principles of the fundamentals of the chemical, physical, and biological properties of soils; their formation, fertility, and management, and the effects of inorganic and organic chemicals on soil processes and properties as they relate to environmental pollution. Two hours of lecture, one hour recitation and three hours laboratory weekly. Prerequisites: MA110 or higher and any two chemistry courses.

2. Course Content:

- A. Fundamental principles of soil science, including topics in soil genesis and classification, soil physics, soil chemistry,
- B. Soil biology, soil fertility
- C. Plant nutrition, soil and natural ecosystems.
- D. Examples of local and global soil-related problems and issues.

3. Rationale for the Course:

- A. This course is recommended for all student considering careers involving engineering/construction, agriculture, landscaping, gardening or environmental management.
- B. It will expose students to methods in practical problem-solving and basic scientific laboratory skills. The scientific methods are also emphasized.

4. Skills and Background Required or Expected:

Prerequisite courses: MA110 or higher and any two chemistry courses.

5. Teaching Methodologies and Anticipated class size:

This course will combine lectures, laboratories and field trips to private and public organizations (e.g. golf course, construction site, farm, Natural Resource Conservation Service). In the laboratory, students will be involved in learning analytical methods and computer skills. A written laboratory report will be required after each laboratory exercise. Anticipated class size: 10 to 15 students.

6. Learning Objectives for Students:

- The Soil formation factors, Soil classification system, Soil morphology and different Soil behavior.
- Learn how soil's chemical, biological, and physical properties affect soil quality as a medium for plant growth.
- Learn how soil's chemical, biological, and physical properties interact to affect soil nutrient utilization by plant as influenced by different soil properties.

- Determine soil's chemical, biological, and physical properties by conducting laboratory exercises.
- Learn how to follow the safety procedures while conducting laboratory exercises.
- Learn the basic analytical skills and calculations

**Note:** With Program Faculty Consultation, an instructor may add additional SLOs to the above Program Faculty approved SLOs.

7. Methods of Evaluation

The methods of evaluation are written exams laboratory reports, and attendance.

8. Methods for Student Learning Outcomes Assessment:

Depending on Instructor and Program Faculty, any one or more of the following may be selected: Pre/Post Test, Course embedded questions; Standardized exams; Portfolio Evaluation; Direct Observation; and Capstone Course Evaluation.

9. Required and Recommended Texts or Study Guides:

The required text is Nyle C. Brady, The Nature and Properties of Soils, Latest Edition, Macmillan Publishing Company.

10. Subsequent Courses:

AG 342 Principles of Agricultural Engineering  
AG 442 Applied Agricultural Engineering  
AG 480 Tropical Soil Management and Fertility  
AG 484 Advanced Vegetable and Field Crop Production  
AG 485 Tropical Fruits Horticulture  
AG 486 Ornamental Crop Production in the Tropics

11. Additional Course Descriptors, if any:

The philosophy of the course will be to combine exposure to the basic principles of soil science with practical demonstrations of the importance of those principles for understanding contemporary agricultural and environmental issues.

The Calendar of Assignments, Assessment Project, a Statement Concerning the "Americans with Disabilities Act" (ADA) Accommodations for Students, Attendance and Grading Policies are to be included in the course syllabus.

**UNIVERSITY OF GUAM  
COURSE OUTLINE**

College: College of Natural and Applied Sciences Course Number: AG/BI 430  
Course Title: Scientific Digital Photography Credit Hours: 3  
Date of Final Approval: \_\_\_\_\_ Semester Offered: Spring Even Years  
Course counts as: \_\_\_\_\_ general education requirement  
\_\_\_\_\_ part of Agriculture major program  
X \_\_\_\_\_ elective

1. Catalog Description:

Student will develop observational aesthetic skills and learn how to extract relevant information from nature using macro-photography, photomicrography, or special exposure and digital processing techniques. This course includes two one-hour lectures and a three-hour laboratory weekly.

2. Course Content:

This course develops the student's skills in observing and documenting natural and scientific phenomena. Students will learn how to select the appropriate camera equipment, settings, and processing of images to communicate their intended ideas using the constraints of scientific ethical considerations of publishing images in scientific literature.

3. Rationale for the Course:

Photography is one of the primary means through which scientific observation and research is documented and presented to colleagues and the public. By developing technical observational and aesthetic skills, students will learn how to extract relevant information from nature using macro-photography, photomicrography, special techniques digital processing.

4. Skills and Background Required or Expected:

None

5. Teaching Methodologies and Anticipated class size:

Lectures will be presented in the computer lab. The weekly laboratory will give hands-on experience for topics covered in the lectures. Students will learn the basics of digital photography, using the computer as a digital darkroom, preparation of information flyers, web pages, presentations and Quicktime movies.

6. Learning Objectives for Students:

Students will be able to:

- Make an exposure appropriate to the visual concept desired to communicate.
- Make an exposure with a digital camera and download it to a workstation and make a print and or screen image.
- Merge and process digital images.
- Given a choice of lenses, the student will be able to select an appropriate focal length to communicate theirs ideas.
- Student will be able to choose the appropriate shutter speed, aperture and ISO to communicate desired idea.
- Given a photograph, the student will be able to articulate criticism regarding the image and



- evaluate its quality.
- Use digital techniques to enhance images to optimize desired image information.
  - Retouch an image to enhance specific objects in the image using the ethical considerations of publishing images in scientific literature.
  - Insert reference lines into images to indicate proper scale.

**Note:** With Program Faculty Consultation, an instructor may add additional SLOs to the above Program Faculty approved SLOs.

7. Methods of Evaluation

8. Methods for Student Learning Outcomes Assessment:

Depending on Instructor and Program Faculty, any one or more of the following may be selected: Pre/Post Test, Course embedded questions; Standardized exams; Portfolio Evaluation; Direct Observation; and Capstone Course Evaluation.

9. Required and Recommended Texts or Study Guides:

Complete Digital Photography. Long, B. Latest Edition. Charles River Media. 428 pp.

10. Subsequent Courses:

None

11. Additional Course Descriptors, if any:

Students will learn to use Adobe Photoshop, Adobe InDesign, Adobe GoLive and Microsoft Powerpoint. Students will understand using scanners, digital cameras, graphics tablet, and printers.

The Calendar of Assignments, Assessment Project, a Statement Concerning the “Americans with Disabilities Act” (ADA) Accommodations for Students, Attendance and Grading Policies are to be included in the course syllabus.

**UNIVERSITY OF GUAM  
COURSE OUTLINE**

College: College of Natural and Applied Sciences Course Number: AG 480  
Course Title: Tropical Soil Management and Fertility Credit Hours: 3  
Date of Final Approval: \_\_\_\_\_ Semester Offered: Spring Even  
Course counts as: \_\_\_\_\_ general education requirement  
                                X   part of   Agriculture   major program  
                              \_\_\_\_\_ elective

1. Catalog Description:

This course examines the origin, development, properties, and management of tropical soils and the importance of key physical, chemical, and biological properties. Emphasis is on application of principles. Prerequisite: AG380

2. Course Content:

This course will examine the characteristics and management of tropical agricultural systems. Students will learn of the principle characteristics of tropical soils including soil classification, soil physical and chemical properties, and plant nutrient and organic matter cycling. In addition, students will be introduced to the role of soil in common tropical agricultural systems including shifting cultivation, agroforestry, and continuous cultivation systems. The concept of sustainable agriculture and the effects of agricultural management on the environment will also be presented and illustrated in examples from tropical regions around the world.

3. Rationale for the Course:

This course is recommended for all students considering careers involving agriculture, international affairs, or environmental science. It will provide students with an understanding of local and global agricultural and environmental issues and the relevance of soil science principles to those issues.

4. Skills and Background Required or Expected:

Prerequisite courses: AG 280 or consent of the instructor.

5. Teaching Methodologies and Anticipated class size:

The course will primarily be in a lecture and discussion format. Students will be encouraged to discuss soil-related problems in tropical agricultural systems and suggest management alternatives. Students will also be shown how to use the World Wide Web and locate e-resources available for learning more about soil sciences and tropical agriculture. Writing and presentation skills will also be developed through requirements of a class presentation and a written paper on a tropical agricultural system. Anticipated class size: 5 to 10 students.

6. Learning Objectives for Students:

- Interpret how soil chemical, biological, and physical factors interact to affect the soil as a medium for plant growth.
- Explain the role of plant nutrients in plant growth and the processes affecting nutrient utilization under tropical conditions.
- Identify nutrient management practices, including the use of soil amendments that

maximize plant productivity and profitability while conserving or enhancing environmental quality under tropical conditions.

**Note:** With Program Faculty Consultation, an instructor may add additional SLOs to the above Program Faculty approved SLOs.

7. Methods of Evaluation

The methods of evaluation are written exams (learning objectives A and B), oral presentation (learning objectives A, B and C), written paper (learning objectives A, B and D), and attendance.

8. Methods for Student Learning Outcomes Assessment:

Depending on Instructor and Program Faculty, any one or more of the following may be selected: Pre/Post Test, Course embedded questions; Standardized exams; Portfolio Evaluation; Direct Observation; and Capstone Course Evaluation.

9. Required and Recommended Texts or Study Guides:

The required text is: Pedro A. Sanchez, Properties and Management of Soils in the Tropics, John Wiley and Sons, 1976.

Recommended texts:

John Ragland and Rattan Lal, Technologies for Sustainable Agriculture in the Tropics, American Soc. of Agron. Special Publication No. 56, 1993.

M.J.T. Norman, C.J. Pearson and P.G.E. Searle, The Ecology of Tropical Food Crops, Latest Edition, Cambridge University Press.

10. Subsequent Courses:

AG 442 Applied Agricultural Engineering  
AG 484 Advance Vegetable and Field Crop Production  
AG 485 Tropical Fruits Horticulture  
AG 486 Ornamental Crop Production in the Tropics

11. Additional Course Descriptors, if any:

The philosophy of the course will be to show how knowledge of soil science principles can assist in understanding tropical agricultural systems and problems related to those systems.

The Calendar of Assignments, Assessment Project, a Statement Concerning the "Americans with Disabilities Act" (ADA) Accommodations for Students, Attendance and Grading Policies are to be included in the course syllabus.

**UNIVERSITY OF GUAM  
COURSE OUTLINE**

College: College of Natural and Applied Sciences Course Number: AG 481  
Course Title: Environmental Soil Science Credit Hours: 4  
Date of Final Approval: \_\_\_\_\_ Semester Offered Spring Odd Years  
Course counts as: \_\_\_\_\_ general education requirement  
\_\_\_\_\_ part of Agriculture major program  
X elective

1. Catalog Description:

An overview of soil properties and their impact on the environment will be discussed. Topics covered include: soil erosion, soil conservation, soil enhancement, non- point source pollution, soil contamination, and waste management. Students will develop skills in soil and water contaminant analysis and environmental assessment. This course weekly consists of three hours of lecture and a three-hour laboratory. Prerequisites: AG/NS380 and MA161a or higher.

2. Course Content:

This course covers topics related to the processes of soil erosion and the off-site damage from sedimentation, soil and water pollution and the impact of non-point source pollution on the environment. The techniques of soil and water conservation and management will also be discussed. Other topics covered in this course include contaminated soil and pollution mitigation. Techniques used for bioremediation of contaminated soils and how soil can be managed to filter out contaminants will be introduced. In the section of waste management benefits and problems associated with utilization and disposal of organic wastes on agricultural and forestlands will be discussed.

3. Rationale for the Course:

This course will also strengthen the student's problem solving abilities and communication skills in the area of soil management from environmental aspect of it. The course will prepare student (both graduate and undergraduates) for the wider job markets such as land management, environmental consultants, waste management and positions in land utilization, soil and water quality assessment, and remediation of contaminated land resources.

4. Skills and Background Required or Expected:

The students of AG 481 should possess a basic knowledge of soil principals and characteristics such as chemical, physical and biological properties of soils. The students of this course should also possess a basic knowledge of math and chemistry and environmental biology. College algebra, pre-calculus and/or any introductory math course should provide the students with basic math requirement for this course. A general chemistry courses such CH 102/CH 102L and environmental biology (BI 100) should provide necessary chemistry and biology background for the students of this course. Since the aforementioned courses are the pre-requisite for the AGINS 280 (principal of soil science) therefore the students who take AG 380 should already be equipped with an appropriate background for this course.

5. Teaching Methodologies and Anticipated class size:

This course is taught in lecture format; however, a lab section is designed to provide students with practical learning experience. Additional background material for the class is obtained from extensive readings of journal articles and books on the various subject covered in this

course. In addition to textbook, additional reading material will be provided by the instructor. The anticipated class size is 7 to 10 students (15 Spring 2003)

6. Learning Objectives for Students:

- List environmental assessment and soil contaminants measuring techniques and analysis.
- Define the processes and impacts of soil erosion (water, wind).
- Explain the soil conservation techniques for controlling soil erosion
- Explain to manage to soil fertility and productivity while maintaining the environmental integrity.
- Identify the techniques that are used for bioremediation of contaminated soils
- Explain how soil can be managed to filter out contaminants before they reach the groundwater.

**Note:** With Program Faculty Consultation, an instructor may add additional SLOs to the above Program Faculty approved SLOs.

7. Methods of Evaluation

The student's progress in AG 481 is evaluated through two midterms and a final exam and class participation. Students also shall perform additional task that consist of out of class project assignment for in class presentation and discussions.

8. Methods for Student Learning Outcomes Assessment:

Depending on Instructor and Program Faculty, any one or more of the following may be selected: Pre/Post Test, Course embedded questions; Standardized exams; Portfolio Evaluation; Direct Observation; and Capstone Course Evaluation.

9. Required and Recommended Texts or Study Guides:

Although there is no required text, students may obtain the following textbooks for this course:

1. Hillel, Daniel. 1998. Environmental Soil Physics. Academic Press, San Diego, CA
2. Ritter, W.F., and A. Shirmohammadi. 2000. Agricultural Nonpoint Source Pollution. Lewis Publishers. New York
3. Winegardner, D. L. 1996. An Introduction to Soils for Environmental Professionals
4. Hassett, J.J., and W.L. Banwart. Soils and their Environment. Prentice Hall Publishers. New Jersey

In addition to the listed textbooks, class material will be derived from the instructor's lecture notes compiled from the material listed and from the professional journals articles published on the subject.

10. Subsequent Courses:

In addition to general core course required for science degrees, AG 481 will better equip students with knowledge and skills for the degree preparation in general agriculture and environmental sciences.

11. Additional Course Descriptors, if any:

None

**UNIVERSITY OF GUAM  
COURSE OUTLINE**

College: College of Natural and Applied Sciences Course Number: AG 484  
Course Title: Tropical Vegetable Production Credit Hours: 4  
Date of Final Approval: \_\_\_\_\_ Semester Offered: Spring Even Year  
Course counts as: \_\_\_\_\_ general education requirement  
\_\_\_\_\_ part of Agriculture major program  
X \_\_\_\_\_ elective

1. Catalog Description:

This course covers topics related to the vegetable crop production in the tropics. Topics include botany and classification of vegetable, crop production and management systems, plant growth and development influenced by genetics and environment factors, vegetable variety development and testing, and vegetable seed production technology. This course meets for three hours lecture and three hours laboratory weekly. Prerequisite: AG281.

2. Course Content:

This course will provide students the overview of science and technology dealing with vegetable crops. Topics will include vegetables in human nutrition, origin, domestication and classification of vegetables, genetic and environmental factors influencing the growth and development of vegetables, variety development and testing, vegetable seed production technology, seed quality testing, crop management, soil management, water management, post-harvest technology for vegetables, and economics of vegetable production in the tropics. Economically and culturally important crops on Guam and other tropical islands of the Pacific will be emphasized.

3. Rationale for the Course:

This course serves as an elective upper division horticulture course for all majors in the Agriculture Degree Program and Agriculture Secondary Education Degree Program. It is the applied horticulture science and technology course for all students in the field of general agriculture, horticultural science, extension horticulture, secondary education in plant sciences, agribusiness, environmental science, conservation and ethnobotany.

4. Skills and Background Required or Expected:

AG 281 and other plant science and biology courses

5. Teaching Methodologies and Anticipated class size:

Format of the course is a series of lectures and a weekly laboratory. Students will conduct research and extension projects of plant sciences. Students also have opportunity to visit sites of crop production and participate in cultivation of crops in field. Written and/or oral presentation of project reports is required. Participation in field production of vegetable crop and record keeping is also major part in class activity. Anticipated class size: 5 to 10.

6. Learning Objectives for Students:

- Student will describe classification of vegetable crops.
- Student will describe growth habit and adaptation of vegetable crops

- Student will identify important vegetable crops produced in Guam, in US and in the world.
- Student will demonstrate growing vegetables using general crop production skills including land preparation, planting, irrigation, fertilizer application, pest control, harvest, and post harvest handling.

**Note:** With Program Faculty Consultation, an instructor may add additional SLOs to the above Program Faculty approved SLOs.

7. Methods of Evaluation

The methods of evaluation are written exams, quizzes, and project reports, participation in lecture and laboratory activity, and attendance.

8. Methods for Student Learning Outcomes Assessment:

Depending on Instructor and Program Faculty, any one or more of the following may be selected: Pre/Post Test, Course embedded questions; Standardized exams; Portfolio Evaluation; Direct Observation; and Capstone Course Evaluation.

9. Required and Recommended Texts or Study Guides:

1. Rubatzky, V. E. and M. Yamaguchi. Latest Edition. World Vegetables: Principles, Production and Nutritive Values. International Thomson Publishing. 843pp.
2. Asian Vegetable Research and Development Center. Latest Edition. Vegetable Production Training Manual. AVRDC. 447pp.

10. Subsequent Courses:

This is an elective upper division course

11. Additional Course Descriptors, if any:

The course will demonstrate the horticultural science and technology on agricultural crops with emphasis on tropical vegetables. Students will learn history of crop production, current methods of plant cultivation on Guam. Current information on vegetable plant management will be obtained by recent journal publications and documents, and through internet.

The Calendar of Assignments, Assessment Project, a Statement Concerning the "Americans with Disabilities Act" (ADA) Accommodations for Students, Attendance and Grading Policies are to be included in the course syllabus.

**UNIVERSITY OF GUAM  
COURSE OUTLINE**

College: College of Natural and Applied Sciences Course Number: AG 486  
Course Title: Ornamental Crop Production in the Tropics Credit Hours: 4  
Date of Final Approval: \_\_\_\_\_ Semester Offered: Spring Odd Years  
Course counts as: \_\_\_\_\_ general education requirement  
\_\_\_\_\_ part of Agriculture major program  
X \_\_\_\_\_ elective

1. Catalog Description:

This course covers topics related to the production of ornamental plants in the tropics. Lectures cover the propagation, management and post-harvest handling of specific crops. Laboratories include plant identification and demonstrations of topics covered in lectures. It meets for three hours lecture and three hours laboratory weekly. Prerequisite: AG281

2. Course Content:

This course provides students an overview of the art, science and technology of propagating and growing ornamental plants. Topics include propagation, growing and finishing potted and nursery plants. Cultivar selection, nursery management, irrigation, structures, and plant identification are also covered. Crops most suited to the tropics will be emphasized. Native plants with ornamental value will be covered. Use of computers will be an integral part of the course including observing web pages and production of printed materials with desktop publishing.

3. Rationale for the Course:

The course is an elective upper division horticulture course for all majors in the Agriculture Degree and Agriculture Secondary Education Degree. Tourism is a major industry in the region and ornamental horticulture plays a key role. Many tourist sites have landscaping, and interiors are decorated with potted plants and cut flowers. This course integrates topics covered in other courses in the production of finished plants.

4. Skills and Background Required or Expected:

AG 281 is required. Courses in biology, crop protection and agricultural engineering are recommended.

5. Teaching Methodologies and Anticipated class size:

Much of the information will be presented as lectures. A weekly laboratory will cover nursery construction and maintenance. Students will select crops to grow during the semester. The students will be responsible for caring for the plants. Written and oral presentation of the project is required. Computers will be used during lectures and laboratories. There will be weekly plants for the student to learn to identify and learn their basic cultural requirements.

6. Learning Objectives for Students:

Students will be able to:

- Identify and describe common ornamental plants.
- Develop a crop production schedule for a nursery operation
- Describe the appropriate pretreatments for plant propagation



- Describe and explain a mist propagation system

**Note:** With Program Faculty Consultation, an instructor may add additional SLOs to the above Program Faculty approved SLOs.

7. Methods of Evaluation

The students will be evaluated by written exams, quizzes, plant id quizzes, project reports, and attendance.

8. Methods for Student Learning Outcomes Assessment:

Depending on Instructor and Program Faculty, any one or more of the following may be selected: Pre/Post Test, Course embedded questions; Standardized exams; Portfolio Evaluation; Direct Observation; and Capstone Course Evaluation.

9. Required and Recommended Texts or Study Guides:

- a. Nau, J. Latest Edition. Ball Perennial Manual: Propagation and Production. George J. Ball Pub.
- b. Holttum, R. E. and I. Enoch. Latest Edition. Gardening in the Tropics. Timber Press, Inc. 384pp.

10. Subsequent Courses:

This is an upper division elective.

11. Additional Course Descriptors, if any:

The course will cover the growing of orchids from pollination through flowering. Use of native and endemic plant materials will be emphasized. Current information will be obtained through recent journals and through internet.

The Calendar of Assignments, Assessment Project, a Statement Concerning the "Americans with Disabilities Act" (ADA) Accommodations for Students, Attendance and Grading Policies are to be included in the course syllabus.