

# COLLEGE OF NATURAL AND APPLIED SCIENCES

## AGRICULTURE AND LIFE SCIENCES PROGRAM

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### OVERVIEW

### OBJECTIVES

Agriculture and Life Sciences Division within the College of Natural Applied Sciences will offer the Master of Science in Sustainable Agriculture, Food, and Natural Resources (SAFNR) Program with two tracks to create leaders and professionals for the next generation needed to address challenges which are closely tied to the global food systems, nutrition and human health, energy security, climate change, as well as agricultural enterprises, using sustainable approaches. The goal of the program therefore, will include educating students and developing and disseminating science-based information to promote sustainable agricultural production, healthy living, and natural resource management that is appropriate for the Western Pacific Region. Courses are offered by faculty from the College of Natural and Applied Sciences, School of Nursing and Health sciences, College of Liberal Arts, and the sponsored programs. Specific objectives of the program include seeking answers to agricultural and natural resources as well as food, nutritional and health related questions, especially those arising in the developing island nations of the Pacific; promoting needed educational and service projects in Western Pacific island communities; and equipping graduates with the knowledge and skills needed for sound scientific inquiry and professional practice, and a solid understanding and commitment to professional ethics in the pacific regions.

### PROGRAM LEARNING OUTCOMES

Upon successful completion of the Program:

- 1.The students will demonstrate the ability to apply, analyze, synthesize and evaluate issues in the areas of sustainable agriculture, food, nutrition and natural resources.
- 2.The students will demonstrate mastery in quantitative and/or qualitative data collection and analysis in

agricultural science, food and nutrition science, as well as the natural resources.

- 3.They will demonstrate ability to write technical scientific reports and articles.
- 4.The students will demonstrate knowledge of current topics and research activities related to sustainable agriculture, food and natural resource sciences in the literature as well as in the island communities.
- 5.Students will demonstrate the ability to conceive, conduct and report original research results.
- 6.Students will apply knowledge and technical skills in order to solve discipline related challenges in tropical systems.

### ADMISSION

#### GENERAL ADMISSION REQUIREMENTS

Applicants must first meet all University of Guam's requirements. For more information please refer to the program's website or email at [safnr@triton.uog.edu](mailto:safnr@triton.uog.edu).

Application packages are first evaluated by the Admissions and Recruitment Committee who then present their recommendation to the Program Chair. Upon approval by the Program Chair, the applicant is admitted to the program.

For matriculating into Graduate Certificate Programs, a certificate advisor must be identified/selected for acceptance into the SAFNR program. Graduate Certificate Program advisors are:

- 1.Sustainable Tropical Agriculture and Natural Resources: Dr. L. Bob Barber
- 2.Tropical Horticulture: Dr. Mari Marutani
- 3.Food Technology: Dr. Jian Yang
- 4.Aquaculture: Dr. Hui Gong-Jiang

Once admitted by the SAFNR program, SAFNR graduate students are expected to:

1. Submit the *Permission for Individual Capstone Project* form to establish their committee by the end of their first semester (i.e. "Thesis" for masters and "Special Project" for certificate programs, respectively).; and
2. Present their proposal as soon as possible after forming their Thesis committee.

## **BACKGROUND AND PERFORMANCE GUIDELINES**

The SAFNR is built around two component disciplines (Tracks): Sustainable Agriculture and Natural Resources, and of Food and Nutrition. Applicants are expected to have backgrounds related to at least one of these disciplines. Related backgrounds are broadly defined. Students who do not possess these background courses will be advised to take key undergraduate courses as part of their program. For example, for Sustainable Agriculture, related disciplines include all the sub-disciplines of biology and other life sciences, such as biochemistry, or genetics; the health sciences; and agricultural, animal, and plant sciences. Disciplines related to Nutrition and/or Food Science include human nutrition, food preparation and processing, health science, food chemistry, food safety, and microbiology. Relevant disciplines also include; applied mathematics, statistics, and computer science. Applicants with other backgrounds, especially with interdisciplinary training or experience, who have completed the prerequisites listed below or can provide other evidence of their ability to successfully complete the core course requirement will be considered as well.

## **TRACKS**

The two tracks of the program will cover the following topics:

### **SUSTAINABLE AGRICULTURE AND NATURAL RESOURCES**

The following topics will be covered in the Track of Sustainable Agriculture and Natural Resources:

- Evaluation methods of plant, soil and natural resources interaction
- Technologies in sustainable agriculture and agro-ecosystem
- Method of selection of plants adapted to environments

- Plant materials in tropical urban landscape and farms
- Evolving methods of engineering technologies in tropical sustainable agriculture
- Effects of soil fertility on plant nutrition and metabolism
- Experimental designs in agricultural field and laboratory
- Sustainable animal production systems
- Agricultural biotechnology
- Tropical aquaculture

### **FOOD AND NUTRITION**

The following topics will be covered in the Track of Food and Nutrition:

- Applications and issues related to nutrition research
- Dietary assessment methods; nutrition monitoring and surveillance
- Evolving methods of assessing health status
- Assessment and treatment of nutritional health risks
- Health promotion and disease prevention theories and guidelines
- Influence of socioeconomic, cultural and psychological factors on food and nutrition behaviour
- Food safety issues, solutions, and regulations
- Food security and value-added food products
- Changes of food quality and components during processing and storage
- Methods of detecting and characterizing microbes and food components.

## **DEGREE REQUIREMENTS**

### **MASTERS DEGREE REQUIREMENTS**

Within the first semester following SAFNR program acceptance, students must choose and be accepted by a faculty advisor with expertise in their selected sub-discipline. In consultation with his/her advisor, each student must select a discipline track that he/she will follow for the remainder of their academic program: 1) Sustainable Agriculture and Natural Resources, and 2) Food and Nutrition as described below. Subsequently,

the student's individual program is developed by the student and his/her advisor and monitored by the advisor and the student's advisory committee. Final program approval requires endorsement by the Program Chair and CNAS Dean, with subsequent approval by the Director of Graduate Studies.

### **COURSE REQUIREMENTS (33 CREDIT HOURS)**

The University of Guam's graduate SAFNR Program is designed to produce graduates equipped with essential knowledge and skills. It fosters a commitment to the highest standards of professional integrity in research and application of Agricultural and Natural Resources as well as Food and Nutrition to matters of public interest.

Among the core courses which are courses are: Advanced Statistical Methods (BI/EV-507, 4 credit hours), Seminars on current topics (AL-691, 1 credit hour), Bio-logical Literature & Scientific Writing (BI/EV-503, 2 hours). These core courses equip students with quantitative skills for rigorous experimental design and, interpretation as well as rigorous training in, scientific writing. Students take all four of these core courses, irrespective of which track they choose for their concentration. This suite of courses, thus equips students with the essential knowledge and skills from each of the two discipline tracks that define the SAFNR program.

Up to 3-credits of Thesis (AL-695) can be earned to prepare his/her Thesis proposal. Students will earn the remaining Thesis (AL-695) credits after his/her proposal is presented and approved.

### **Core Courses (13 credit hours)**

The CORE curriculum for ALL TRACKS consists of four courses totaling 13 credit hours:

Course	Course Title	Credits	Term Offered
BI503	BIOLOGICAL LITERATURE AND SCIENTIFIC WRITING	2	SPRING ONLY/ ALL YEARS
BI507	ADVANCED STATISTICAL METHODS	4	FALL ONLY/ ALL YEARS
EV503	BIOLOGICAL LITERATURE AND SCIENTIFIC WRITING	2	SPRING ONLY/ ALL YEARS
EV507	ADVANCED STATISTICAL METHODS	4	FALL ONLY/ ALL YEARS
AL691	SEMINAR AND CURRENT TOPICS	1	SPRING ONLY/ ALL YEARS
AL695	THESIS	1 - 6	FALL/SPRING/ ALL YEARS

### **Agricultural and Natural Resource Track (9 credit hours)**

For the Agricultural and Natural Resource Track students must choose minimum of 9 credit hours from the following courses:

Course	Course Title	Credits	Term Offered
AL443G	TECHNOLOGIES FOR SUSTAINABLE TROPICAL AGRICULTURE	3	SPRING ONLY/ ODD YEARS
AL443L/ G	TECHNOLOGIES FOR SUSTAINABLE TROPICAL AGRICULTURE LABORATORY	1	SPRING ONLY/ ODD YEARS
EV512	ENVIRONMENTAL SCIENCE: ECONOMICS-MANAGEMENT-LAW	3	SPRING ONLY/ ALL YEARS
AL536	ADVANCES IN SUSTAINABLE AQUACULTURE	3	FALL ONLY/ ODD YEARS
EV561	URBAN LANDSCAPE MANAGEMENT	3	FALL ONLY/ EVEN YEARS
AL566	AGROECOLOGY FOR ISLAND SUSTAINABILITY	3	SPRING ONLY/ EVEN YEARS
AL570	SUSTAINABLE ANIMAL PRODUCTION SYSTEMS	3	SPRING ONLY/ ALL YEARS
AL581	PRINCIPLE OF PLANT NUTRITION	3	SPRING ONLY/ EVEN YEARS

### Food and Nutrition Track (9 credit hours)

For the Food and Nutrition Track students must choose minimum of 9 credit hours from the following courses:

Course	Course Title	Credits	Term Offered
BI419G	BIOCHEMISTRY	3	SPRING ONLY/ ALL YEARS
CH419G	BIOCHEMISTRY	3	SPRING ONLY/ ALL YEARS
AL439G	COMMUNITY NUTRITION	3	SPRING ONLY/ ODD YEARS
AL445G	FOOD CHEMISTRY	3	SPRING ONLY/ ODD YEARS
AL455G	NUTRITIONAL ASSESSMENT	3	SPRING ONLY/ ODD YEARS
AL460G	ADVANCED HUMAN NUTRITION	4	FALL ONLY/ EVEN YEARS
AL505	NUTRITIONAL EPIDEMIOLOGY	3	SPRING ONLY/ ODD YEARS
AL542	ADVANCED FOOD SAFETY	3	FALL ONLY/ EVEN YEARS
AL539	PUBLIC HEALTH NUTRITION	3	FALL ONLY/ ODD YEARS

### Elective Courses (11 credit hours)

Beyond the core courses, each student must complete at least 11 credit hours from the elective courses related to his or her selected area of concentration and agreed upon by his or her advisor. Elective courses should be selected upon consultation with the thesis committee to support the chosen research track. See General requirements for research thesis. Research thesis in SAFNR program are expected to make an original contribution to the selected sub-discipline and reflect mastery of the knowledge and skills required to successfully pursue of advanced study and research in the aforementioned science degree program.

Students are to choose a minimum of 11 credit hours from the following list or any graduate courses with advisor's recommendation:

Course	Course Title	Credits	Term Offered
AL443G	TECHNOLOGIES FOR SUSTAINABLE TROPICAL AGRICULTURE	3	SPRING ONLY/ ODD YEARS
AL443L/ G	TECHNOLOGIES FOR SUSTAINABLE TROPICAL AGRICULTURE LABORATORY	1	SPRING ONLY/ ODD YEARS
AL451G	AGRICULTURAL BUSINESS MANAGEMENT	3	SPRING ONLY/ ODD YEARS
MI501	PEOPLES AND CULTURES OF MICRO	3	FALL ONLY/ ALL YEARS
EV535	TROPICAL CLIMATE & CLIMATE VARIABILITY	3	FALL ONLY/ EVEN YEARS
EV510	ENVIRONMENTAL SCIENCE: BIOLOGY/ ECOLOGY	3	FALL ONLY
AL481G	ENVIRONMENTAL SOIL SCIENCE	3	SPRING ONLY/ ODD YEARS
AL481L/ G	ENVIRONMENTAL SOIL SCIENCE LABORATORY	1	SPRING ONLY/ ODD YEARS
HS405G	EPIDEMIOLOGY	3	FALL/SPRING/ ALL YEARS
EV506	PHYSICAL GEOGRAPHY OF MICRONESIA	3	FALL ONLY/ EVEN YEARS
MI514	HEALTH AND HUMAN ADAPTATION	3	SPRING ONLY/ ODD YEARS

Course	Course Title	Credits	Term Offered
	IN MICRONESIA		
AL563	MGMT & RECYCLING OF ORGANIC WASTE	3	FALL ONLY/ ODD YEARS
AL698	INTERNSHIP IN SUSTAINABLE AGRICULTURE, FOOD AND NATURAL RESOURCES	1 - 3	FALL/SPRING/ ALL YEARS
AL691	SEMINAR AND CURRENT TOPICS	1	SPRING ONLY/ ALL YEARS
AL692	TEACHING/ RESEARCH ASSISTANTSHIP	1	FALL/SPRING/ ALL YEARS

Students are required to take a minimum of 33 credit hours to graduate from the SAFNR program. A thesis with a satisfactory grade point average of 3.0 or higher will confer the Master of Science in Sustainable Agriculture, Food and Natural Resources (SAFNR).

## GRADUATE CERTIFICATE PROGRAM

The Graduate Program in Sustainable Agriculture, Food and Natural Resources (SAFNR) also offers a Graduate Certificate to students who have successfully completed a total of 15 credit hours with a satisfactory grade point average of 3.0 or higher in one of these four concentration areas:

1. Graduate Certificate in Sustainable Tropical Agriculture and Natural Resources
2. Graduate Certificate in Tropical Horticulture
3. Graduate Certificate in Food Technology

4. Graduate Certificate in Aquaculture

## COURSE REQUIREMENTS (15 CREDIT HOURS)

### Core Courses (3 credit hours)

The CORE requirements for all Graduate Certificate Programs:

Course	Course Title	Credits	Term Offered
AL691	SEMINAR AND CURRENT TOPICS	1	SPRING ONLY/ ALL YEARS

## CONCENTRATION REQUIREMENTS (14 CREDIT HOURS)

Selection of courses for each concentration area will be determined by the Student, Advisor, and one additional committee member of the programs, and approved by the Dean of the College of Natural and Applied Science. Courses recommended for each concentration are listed below, yet not limited these courses.

### Sustainable Tropical Agriculture and Natural Resources (14 credit hours)

Minimum of 14 credit hours

#### SET 1

Course	Course Title	Credits	Term Offered
AL566	AGROECOLOGY FOR ISLAND SUSTAINABILITY	3	SPRING ONLY/ EVEN YEARS

#### SET 2

Choose one of the following:

Course	Course Title	Credits	Term Offered
AL443G	TECHNOLOGIES FOR SUSTAINABLE TROPICAL AGRICULTURE	3	SPRING ONLY/ ODD YEARS
AL481G	ENVIRONMENTAL SOIL SCIENCE	3	SPRING ONLY/ ODD YEARS
AL451G	AGRICULTURAL BUSINESS MANAGEMENT	3	SPRING ONLY/ ODD YEARS

**SET 3**

Choose one of the following:

Course	Course Title	Credits	Term Offered
EV561	URBAN LANDSCAPE MANAGEMENT	3	FALL ONLY/ EVEN YEARS
AL563	MGMT & RECYCLING OF ORGANIC WASTE	3	FALL ONLY/ ODD YEARS

**SET 4**

Choose one of the following:

Course	Course Title	Credits	Term Offered
AL570	SUSTAINABLE ANIMAL PRODUCTION SYSTEMS	3	SPRING ONLY/ ALL YEARS
AL536	ADVANCES IN SUSTAINABLE AQUACULTURE	3	FALL ONLY/ ODD YEARS

**Tropical Horticulture (14 credit hours)**

Minimum of 14 credit hours

Course	Course Title	Credits	Term Offered
AL566	AGROECOLOGY FOR ISLAND SUSTAINABILITY	3	SPRING ONLY/ EVEN YEARS
AL698	INTERNSHIP IN SUSTAINABLE AGRICULTURE, FOOD AND NATURAL RESOURCES	1 - 3	FALL/SPRING/ ALL YEARS

Choose one of the following:

Course	Course Title	Credits	Term Offered
EV561	URBAN LANDSCAPE MANAGEMENT	3	FALL ONLY/ EVEN YEARS

Choose one of the following:

Course	Course Title	Credits	Term Offered
AL481G	ENVIRONMENTAL SOIL SCIENCE	3	SPRING ONLY/ ODD YEARS
AL481L/G	ENVIRONMENTAL SOIL SCIENCE LABORATORY	1	SPRING ONLY/ ODD YEARS

OR

Course	Course Title	Credits	Term Offered
AL581	PRINCIPLE OF PLANT NUTRITION	3	SPRING ONLY/ EVEN YEARS

## Food Technology

Minimum of 14 credit hours

Course	Course Title	Credits	Term Offered
AL439G	COMMUNITY NUTRITION	3	SPRING ONLY/ ODD YEARS
AL445G	FOOD CHEMISTRY	3	SPRING ONLY/ ODD YEARS
AL451G	AGRICULTURAL BUSINESS MANAGEMENT	3	SPRING ONLY/ ODD YEARS
AL539	PUBLIC HEALTH NUTRITION	3	FALL ONLY/ ODD YEARS
AL542	ADVANCED FOOD SAFETY	3	FALL ONLY/ EVEN YEARS

## Aquaculture

Minimum of 14 credit hours

Course	Course Title	Credits	Term Offered
AL536	ADVANCES IN SUSTAINABLE AQUACULTURE	3	FALL ONLY/ ODD YEARS
AL542	ADVANCED FOOD SAFETY	3	FALL ONLY/ EVEN YEARS
AL451G	AGRICULTURAL BUSINESS MANAGEMENT	3	SPRING ONLY/ ODD YEARS

### SET 2

Choose one of the following:

Course	Course Title	Credits	Term Offered
EV508	SCIENTIFIC COMPETENCE AND INTEGRITY	3	FALL ONLY/ ALL YEARS
BI508	SCIENTIFIC COMPETENCE AND INTEGRITY	3	FALL ONLY/ ALL YEARS

### SET 3

Choose one of the following:

Course	Course Title	Credits	Term Offered
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OR

Course	Course Title	Credits	Term Offered
BI540	ICHTHYOLOGY	3	SPRING ONLY/ EVEN YEARS
BI540L	ICHTHYOLOGY LABORATORY	1	SPRING ONLY/ EVEN YEARS

OR ONE OF THE FOLLOWING:

Course	Course Title	Credits	Term Offered
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For more information on Graduate certificate please refer to the program's website or email at [safnr@triton.uog.edu](mailto:safnr@triton.uog.edu).

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