

Agricultural Science

Years 9-12

Samoa Secondary School Curriculum

Curriculum Design and Materials Division
Ministry of Education, Sports and Culture
Apia 2022

Agricultural Science. Years 9–12
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Introduction

Agricultural Science in secondary schools is the study about the practices included within the field of farming. Agricultural science and agriculture, although related to each other, are fundamentally very different from one another. Agriculture is the art of growing plants, fruits and vegetables for human consumption. Agricultural science, on the other hand, deals with the study of improvement and development in methods of production like irrigation management, pest control etc. It includes the processes necessary for improving the quality and quantity of agricultural products.

Agricultural science deals with changing the primary products to finished, consumption-ready products. It also involves the preven-

tion and correction of adverse factors hindering productivity. It has been referred to as a local science because of its strong relation to the local areas. It is often considered to be a science dealing with eco-regions as it depends largely on climate and properties of soil in a particular area.

Today, around the world teachers believe that schools play a vital role in the study of agriculture, food, fibre, and natural resources. Further teachers have noted the connection between students' understanding of food and food production to developing a respect nutrition agriculture's role in society and the environment

The study of Agricultural Science will prepare students to respond to global issues such as poverty and climate change.

Structure of the Agricultural Science Curriculum

This curriculum statement is organized around the following;

- **General Aims:** general statements outlining the purposes of studying Agricultural Science;
- **Strands:** categories used to organize concepts into branches of learning;
- **Sub-strands:** statements relating to several key ideas that are foundational concepts for each strand and expected of students to understand and learn;
- **Major and Key Learning Outcomes:** descriptions of specific outcomes derived from sub-strands that relate to the knowledge or skill that students are expected to understand and achieve;
- **Learning Outcomes:** statements of the learning students should be able to demonstrate as a result of a learning experience;
- **Approaches to Teaching and Learning:** strategies to support the teaching and learning;
- **Assessment and Evaluation:** types of assessment and evaluation practices to gauge and measure students' progress as well as the success of teaching methodologies.
- **Essential Skills:** broad skills that are developed throughout the years of schooling.
- **Key Principles:** key principles from The National Curriculum Framework
- **Values:** the beliefs and attitudes of an individual or a group of individuals that are used to respond to everyday situations.
- **Language:** the use and maintaining of Science language as in contents.
- **Gender issues:** the behaviours and attitudes that are culturally accepted and respected as the natural ways of being a female and of being a male.
- **Inclusive Education:** the curriculum needs to cater for all students of different calibers and abilities including physical abilities.
- **Time allocation:** Minimum hours of teaching required for all levels.
- **Safety:** importance of safety and implications in teaching and learning Science.

Key Principles

The key principles as listed in the National Curriculum Framework underpin all aspects of Samoan education. This includes the development of curriculums. The key principles are;

- **Equity:** equity requires that the system treats all individuals fairly and justly in the provision of educational services.
- **Quality:** educational quality is exemplified by high standards of academic achievement, cultural understanding and social behaviour and results from a complex interplay of professional and technical factors and social and cultural practices.
- **Relevance:** a system that is meaningful, recognized, applicable, and useful to one's life. It should enhance individual and community well-being and ultimately national development.
- **Efficiency:** demonstrated by leadership and management practices that ensure optimum use of resources- human, financial and material- at all levels, efficient service delivery, effective communication and coordinated and transparent decision-making.
- **Sustainability:** the wise use of human, financial and material resources to ensure balanced and continual developments in the system with necessary transparency and accountability in place at all levels.

The Agricultural Science curriculum is based on the Principles of the Samoa Secondary School Curriculum as stated in the Samoan Secondary School Curriculum Overview Document and the key and curriculum principles as outlined in the National Curriculum Framework.

The Principles are that the curriculum:

- provides a challenge for all students, reflects the need to be inclusive and allows individual differences;
- fosters and enhances the self-concept of all learners, and encourages them to be self-directed in their learning;
- provides all learners with a broad and balanced general education;
- will be based on what is best in Samoan tradition: fa'aSamoa;
- will be responsive to change so that it is relevant to the needs of the individual learner, the well-being of the community, and ultimately national developments;
- provides for flexibility, taking into account the context in which schools operate and the resources available to them;
- establishes a direction for learning and ensures each learner's school experience in a systematic and coherent way;
- promotes the presentation of essential knowledge by means of a systematic methodology;
- promotes language learning in all areas of the curriculum;
- encourages the use of good assessment practices;

The Agricultural Science Curriculum

The Agricultural Science curriculum sets out progressions of skills and knowledge for all secondary school students. This curriculum statement applies to:

- all secondary schools in Samoa;
- all students irrespective of gender, ethnicity, belief, ability, social or cultural background;
- Years 9-12 of secondary schooling.

Each school provides programmes of learning, which may be part of, or the entire national curriculum, in response to local needs, priorities, and resources. The Agricultural Science Curriculum Statement provides a basis for teachers to plan programmes for teaching Agricultural Science in secondary schools. The learning programmes developed by schools must provide the experiences and opportunities for students to achieve as much as possible the standards and learning outcomes set out in the national curriculum.

General Aims

The general aims of the Agricultural Science curriculum are to provide opportunities for students to:

1. Develop knowledge and skills to enable them to best utilise available resources.
2. Improve their potential to work in the agricultural industry or to pursue further study in this subject.
3. Adopt the use of sustainable agricultural techniques and appropriate technology to help the community economically, socially, culturally and to combat climate change.
4. Increase their understanding of agricultural technology and techniques and the ensuing effects of these on the environment and agriculture.
5. Practise sustainable farming methods to respond to the impacts of climate change in Samoa.

Strands

The Agricultural Science curriculum is comprised of six strands. The strands are:

- Agriculture;
- Soils;
- Farm Management, Economics and Marketing;
- Crop Production;
- Animal Production;
- Tools, Equipment and Facilities.

Important Notes:

Information on climate change impacts and adaptation methodologies have been incorporated into each strand.

Agricultural Science investigation skills are an essential part of the curriculum and are included within ALL the strands.

Sub-Strands

Each strand has sub-strands. These sub-strands group the major learning outcomes at each year or level.

1. In their study of **Agriculture** students will develop their knowledge and understanding of:

- Agriculture in Samoa;
- Variation and genetics.

2. In their study of **Soils** students will develop their knowledge and understanding of:

- The importance of soil.

3. In their study of **Farm Management, Economics and Marketing** students will develop their knowledge and understanding of:

- How to better manage their resources;
- How to manage their resources economically;
- How to market products.

4. In their study of **Crop Production** students will develop their knowledge and understanding of:

- Crop production in Samoa;
- Plant features;

- The management of plant growth;
- Plant processes.

5. In their study of the **Animal Production** students will develop their knowledge and understanding of:

- The importance of livestock breeds and systems;
- Correct handling and management practices;
- Management of growth and reproduction;
- Management of animal health;
- Management of nutrition and feeding.

6. In their study of **Tools, Equipment and Facilities** students will develop their knowledge and understanding of:

- Their safe use and maintenance.

7. In their study of **Communication in Agriculture** students will develop their skills in:

- Oral communication;
- Written communication.

Major Learning Outcomes and Learning Outcomes

Samoa's education curriculums are outcomes-based. An outcomes-based curriculum clearly identifies the knowledge, skills, attitudes and values that all students should be able to acquire and demonstrate at each year level in each subject of study. Teachers are able to teach and students are able to learn effectively when the learning outcomes are made explicit.

The learning outcomes are what students should be able to demonstrate they know and can do using the knowledge and understanding of the contents they learn, and ensure that students realize their individual capability as they progress from one level to the next.

The learning outcomes enable teachers to closely monitor the progress of students, so that appropriate counseling and interventions are provided whenever needed and report to parents accordingly.

The major learning outcomes, relating to the sub-strands, are outlined within each strand explicitly showing the knowledge and essential skills which students should develop and achieve as a result of their active engagement with the Agricultural Science contents through a variety of activities and experiences.

Approaches to Teaching and Learning

Teaching and Learning is a process by which new understandings are constructed. Students learn best when they take action themselves to generate and create meaning, and apply the new knowledge in meaningful situations.

Teaching practices must aim for effective learning. Students are more likely to be engaged in effective learning if teachers use interactive activities such as discussion, investigation and reflection, problem solving, and peer work. These types of activities help students to think deeply about the content they are learning.

There are also general approaches that are part and partial of everyday teaching and learning. These approaches include, but not limited to the following:

- discussing with students the achievement objectives and learning outcomes and success criteria to achieve them.

- recognizing that learning is demonstrated and communicated through oral and written academic language that should be explicit and articulate.
- adopt the three R's – Read, Research and React as a proactive strategy for studying ahead of schedule. Read the material before the teaching is delivered, research by finding out more about what has been read and then react by self-testing one's own understanding, and noting down what is not understood to discuss with teachers.
- allowing ample time to provide feedback and formulate responses and actions to eliminate obstacles to students' progress and/or enhance successful learning.

Assessment and Evaluation

The National Curriculum framework recognises the relationship between all aspects of a curriculum and methods of assessment because assessment is the cornerstone of outcomes-based learning in all subjects and it is an integral part of teaching and learning in every classroom. It is the process of collecting and evaluating evidences of students' learning in order to determine the progress of students, and to inform judgements and interventions to improve students' performances.

An outcomes-focused approach to assessment should involve, but not limited to the following:

- constructing a range of assessment practices to provide useful information on students' progress against the achievement objectives stated in the curriculum.
- encouraging the use of local resources and improvising by using what is available for projects, experiments and research.
- promoting and encouraging skills and

knowledge internal assessments such as independent or individualized research/projects, oral presentations to test students' knowledge and understanding of the curriculum, practical experimenting with oral and written communication of findings etc.

- keeping assessment and evaluation as an ongoing process where feedback comments are provided to the students on a timely basis and interventions and other support are provided wherever and whenever needed.
- timely reporting to parents or guardians of students' performances so that parental support is involved in the push to improve where needed.
- providing opportunities for students to be involved in the planning of the assessment of their own work.

- construction of written assignments, tests and examinations to include questions that tests individual interpretations of a situation i.e. where there is no set right answer. Such assessments encourage the students to think beyond just rote recalling of formulas, calculations and concepts.
- providing opportunities for students to explore and experience application of agricultural practices, methodologies that respond to impacts of climate change etc. Assessment, learning and teaching as an ongoing process is illustrated in Figure 1.

There are three purposes of assessment:

1. Assessment for learning
2. Assessment as learning
3. Assessment of learning.

Assessment for learning

these assessments should be diagnostic and feedback assessments (classroom activities/homeworks/assignments) so the teacher can improve the teaching and learning by diagnosing the learning strengths and weaknesses of students before the teaching and learning continues. The results of diagnosis should enable the teachers to give constructive feedback and formulate activities and responses to improve the learning where needed and ensuring the learning proceeds satisfactorily.

Assessment as learning

these assessments are learning outcomes based. Activities are constructed to test the students' understanding of the learning outcome

Essential Agricultural Science Skills

Essential skills are the broad skills that should be developed and acquired throughout the years of schooling. Such skills involve, but not limited to the following:

- i. Communicating effectively and articulately
- ii. Problem solving
- iii. Using aesthetic judgement or visual aids or arts
- iv. Social and cultural skills and attributes
- v. Work and study skills

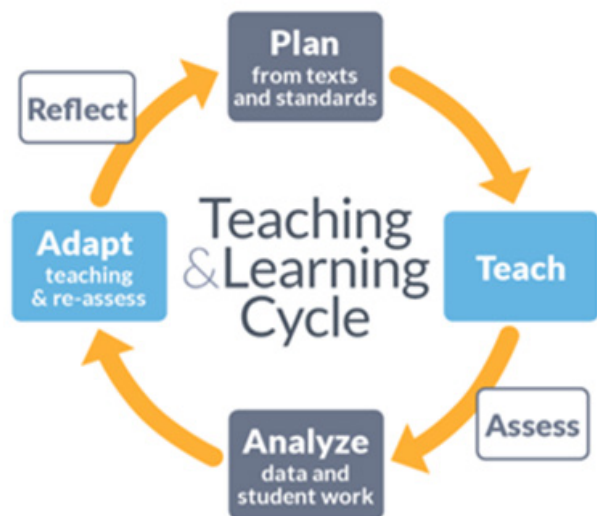


FIGURE 1. Assessment, learning and teaching as an ongoing process

expected of them. Constant and timely feedback must be provided so that students are aware of their responsibilities as learners.

Assessment of learning

these assessments are summative tests and examinations that take place at the end of a unit or strand or end of a term. It is equally important as the other assessments above, that the feedback for students to be constant and timely so that ample opportunities and time for students to react and contribute to correcting or improving their own learning are provided.

Good assessment practices should be fair, valid, open, reliable and manageable.

- vi. Integrating knowledge
- vii. Using technology effectively

Agricultural Science programmes should provide students with the opportunity to carry out a range of actions relating to managing plant growth, handling animals, development and marketing of a product and investigating Agricultural Science ideas and concepts.

The following section details the progression in skill development from year 9 to year 12.

Management of Plant Growth Skills

Year 9 and 10

Agricultural Students will be achieving at Year 10 when they can do the following skills:

Site Selection

Select a site suitable for growing each vegetable or field crop e.g., climate, soil type, aspect, water source access.

Site Preparation

- Demonstrate and describe correct soil preparation techniques.
- Use information to determine seeding rates, plant spacing and fertiliser rates.

Planting

Demonstrate and describe the correct planting of procedures for growing seeds or seedling preparation and planting out.

Management of Growth

- Demonstrate and describe good management of plant growth e.g., weeding, drainage, fertiliser use.
- Control of weeds, pests and diseases.
- Describe and use appropriate methods for the control of weeds diseases.

Harvest

Demonstrate and describe correct harvest technique.

Year 11 and 12

Agricultural Students will be achieving at Year 12 when they can do the following:

Site Selection

- Justify the selection of a site for growing each vegetable or field crop.
- Justify the selection of a forestry species for a particular site and particular purpose e.g., teak for furniture, poumuli for fale posts.

Site Preparation

- Demonstrate and compare a range of soil preparation techniques.
- Calculate seeding rates, plant spacing, and fertiliser rates.

Planting

Demonstrate and evaluate procedures for growing seedlings in a nursery.

Explain the choice of planting material from a range of possible types and sources e.g., seeds, seedlings, tissue culture.

Management of Growth

- Demonstrate and justify growth techniques used for managing plant growth e.g., weeding methods, irrigation, plant support.
- Explain the purpose of techniques used to manage plant growth for field crops e.g., hormone application (pineapple), pruning (cocoa).
- Control of weeds, pests and diseases.
- Evaluate environmental health impacts associated and diseases with the use of control methods for weeds, pests and diseases.

Harvest

- Demonstrate and evaluate a range of different harvest techniques.
- Explain harvest and preparation techniques for field crops e.g., fermentation and drying of cocoa.

Production Development Skills

Year 9 and 10

Agricultural Students will be achieving at Year 10 when they can do the following:

Gathering Information

Gather and collate information to identify possible products for the local community e.g., tomatoes for lunches, bananas for chips, Chinese cabbage for the family, coconuts for market, eggs for market.

Product Selection

Explore factors and select possible products, justifying the decision e.g., cost, use of seeds or seedlings, growing timing, availability.

Product Development

Prepare and carry out a plan of action to produce the selected products.

Record keeping

Keep activity and financial records e.g., problem encountered, solutions tried, cost, returns.

Marketing

Carry out marketing of the product and discuss the outcomes.

Communicating

Present plans with examples of their intentions, progress and outcomes to a selected group, using suitable means of communication.

Evaluation

Review decisions discussing how satisfied they are with their progress and outcomes (product and profit).

Year 11 and 12

Agricultural Students will be achieving at Year 12 when they can do the following:

Gathering Information

Gather and collate qualitative and quantitative information on consumer preferences for products for development e.g., interviews, shopping counts.

Product Selection

Consider relevant factors, resources and constraints and select a product for development e.g., tomato sauce, chips.

Product Development

- Develop plans of action, development identifying the required resources (time, human, material, financial).
- Produce a product to meet agreed or specified criteria e.g., quality, time.

Record keeping

Keep activity and financial records and evaluate the decisions made e.g., watering rates or methods.

Marketing

Carry out marketing of the product and evaluate the outcomes.

Communicating

Present and promote plans, strategies and outcomes using communication forms appropriate for their audience.

Evaluation

Review decisions and appraises outcomes in relation to intentions and agreed criteria e.g., cost effectiveness, environmental impact.

Investigation Skills

Year 9 and 10

Agricultural Students will be achieving at year 10 when they can do the following:

Planning

- Ask a question relating to a problem or observation and write a testable hypothesis.
- Design “fair tests”, simple experiments and surveys with an attempt to control obvious variables.

Gathering Information

- Gather information from different source.
- Gather information related to the question or topic.

Processing Information

Select information related to a question or topic.

Interpreting and Drawing Conclusions

Draw a conclusion from the processed information that relates to the hypothesis, question or topic.

Reporting

Report what they found out from their research of the question or topic relevant to the question or topic.

Year 11 and 12

Agricultural Students will be achieving at year 12 when they can do the following:

Planning

- Ask a series of questions relating to a problem or observation, makes a selection for investigation.
- Design “fair tests”, experiments and surveys, with clear identification and control of variables.

Gathering Information

- Gather information from wide range of sources.
- Gather qualitative and quantitative information that relates to the question or topic.

Processing Information

Use complex information processing techniques to process information related to a question or topic.

Interpreting Information

Draw and justify conclusions from the processed information that relates to the hypothesis, question or topic.

Reporting

Report their findings relevant to the question or topic and the intended reader in a clear concise manner.

Language and Learning

The language associated with learning in subject areas is often abstract and demanding for any learner. Learning is even more complex for students who must learn through the medium of their second language, English. Second language learners of English are required to develop their English language for school learning at the same time as learning the subject content. They are expected to use English to reason through to con-

clusions, read and understand written texts, develop arguments, analyse, synthesise and evaluate ideas. Furthermore they are assessed in English on how well they express themselves either orally or in writing. Students who learn English as their second language may take at least 5 to 7 years to develop English language skills for academic learning compared to their peers for whom English is the first language.

Language Functions Across Subject Areas

Language functions refer to the purposes for which language is being used. For example, language can be used to express and respond to greetings, give reasons, give instructions, ask for help and so on. There are a number of language functions necessary for understanding content across the curriculum. A lot of language functions are common to all subjects. For example, whether students are learning about soil erosion in Agricultural Science or food spoilage in Food and Textiles Technology, central to both topics is the concept of cause and effect, and the language function involved is Expressing Cause and Effect. The words and sentence structures used to express the same language function e.g., cause and effect, in different subjects will be the same.

The curriculum statements require students to be able to understand and produce oral and written texts that are: descriptions; explanations; reports e.g., of field trips, experiments, investigations or research; summaries; recipes; design briefs; instructions; arguments.

The production of these texts requires students to be able to use one or a number of language functions as outlined in the table above. For example, to produce an explanation of a process such as photosynthesis, students will need to be able to use language to define, express cause and effect, describe change, and classify.

All students must develop the language associated with learning in Agricultural Science. Teachers in all subject areas are teachers of language. In practice it requires Agricultural Science classroom programmes to have specific language objectives. The language that students will need in order to understand and talk about content and to participate effectively in learning activities in Agricultural Science should be identified and taught together with the appropriate content. In this way language is developed in relevant and meaningful contexts.

Communication Skills

Communication skills are essential for all students to develop. Students need to be able to interpret and critically evaluate information that is received either by listening, reading or viewing. They also need to be able to communicate clearly, confidently, and appropriately through speaking and writing, and through other forms

of communication and technologies. The development of these skills needs to be supported in all areas of the curriculum. Like language skills, communication skills required in the achievement objectives need to be identified and taught together with the appropriate content.

Concept and Values

Health and well-being are an integral part of life. They impact on all aspects of a person's growth, development, relationship and communication with others. They impact on their socio-economic, emotional, and spiritual life.

Therefore it is recognized that there are underlying concepts which are basic to all the strands and cannot be contained in any one. The following ideas or concepts flow through the curriculum and have an impact on all aspects of health.

- Samoa is founded on God and Samoa is a Christian nation. Attending church, praying and other religious activities are part of the Samoan way of life.
- The Samoan Culture is based on fa'aaloalo (respect, reciprocity or sharing and receiving), alofa (love and compassion), tautua (service), aganu'u tälimalö (hospitality) and fealofani (positive relationships).
- Samoans' strong sense of values (tulaga e fa'atäuaina), cultural practices (fa'asamoa) and beliefs (talitonuga) are exhibited in the loving and caring nature of the people.
- Samoan identity (faiā ma le fa'asinomaga) is based on the extended family ('äiga potopo-

to), with strong linkages to the land.

- Relationships (va feāloai) are significant in the family, village, district structure and in communicating with others e.g., between brother - sister (feagaiga), parent - child, (mātua - fānau), elder - youth, (matua - la'ititi), eldest and youngest sibling, (ulumatua ma le ui'i) experienced versus knowledge, (mua mai - muli mai), husband - wife (tane - avä), matai and family (fa'amatai), matai in the village council and district level.
- Like other cultures, the Samoan culture goes through changes. The education of young people must uphold the critical traditions of education and religious beliefs while accommodating what is necessary in modernisation. The issues facing young people growing up in a changing Samoan society require opportunities for self-expression in an environment that enhances the holistic development of each individual whilst reinforcing the principle of co-operation and group effort that are the essence of fa'asamoa.

Gender

The Samoa Secondary School Curriculum requires education to be gender-inclusive. This means students should not be excluded from developing good self-esteem or from participating fully and successfully in learning because of narrow gender stereotypes. An example of a narrow gender stereotype that is beginning to change is "only boys can become taxi drivers."

Materials used with this curriculum must give learners the opportunities to understand how females and males can have a wide range of occupations, tasks and responsibilities. Materials must also use gender-neutral language where possible. The use of the term 'artificial' instead of 'man-made' is an example of using gender-neutral language.

School programmes and classroom learning tasks should reflect the diversity of roles available to women and men and girls and boys. Teachers

need to ensure that gender is not an obstacle to learning, success, or individual value. Agricultural science programmes will ensure that:

- the interests, perspectives, and contributions of both females and males are included in programme content, resources and methods of teaching;
- both females and males use agricultural tools and equipment and take part in investigations and practical work;
- both females and males take active and valued leadership roles in activities;
- both females and males have equitable access to resources, including teachers' time, learning assistance and technological equipment.

Inclusive Education

The Ministry of Education, Sports and Culture is committed to providing high-quality inclusive education to all Samoan students within a school culture based on respect and acceptance.

A key component of quality education is the provision of appropriate programmes for students with special needs or at risk because of social or economic circumstances. The principle

that 'All students can be successful learners' recognises that all students can succeed when they are provided with sufficient time, support and effective teaching. This ensures that the aims of social justice and equity are seen in practice as all students irrespective of race, ethnicity, disability or socio-economic background can achieve quality educational outcomes.

Time Allocation

The following time allocation is based on the assumption that a school year consists of 40 teaching weeks and should only be taken as a guide. This breakdown is based on periods of 1

hour duration and 4 periods per week. Time for the internal assessment activities must be included within this allocation.

| Strands | Recommended Time Allocation (weeks) | Weighting (%) |
|-----------------------------------------|-------------------------------------|---------------|
| Agriculture | 3 | 8 |
| Soil | 4 | 10 |
| Farm Management, Economic and Marketing | 8 | 20 |
| Crop Production | 10 | 24 |
| Animal Production | 12 | 30 |
| Tools, Equipment and Facilities | 3 | 8 |

Safety

Safety should permeate all aspects of teaching Agricultural Science. Teachers and students should be aware of the safety implications of exploratory or investigatory work. Safety acces-

sories and wear must be provided for practical activities where necessary. Students should be encouraged to observe safe and hygienic ways of working during practical activities.

Agricultural Science Overview

STRAND 1: Agriculture

MAJOR LEARNING OUTCOME

Students are able to demonstrate knowledge and understanding of agriculture in Samoa and variation & genetics.

| SUB-STRANDS | YEAR 9 | YEAR 10 | YEAR 11 | YEAR 12 |
|--------------------------|--------------------------------------------------------------|------------------------|---------------------------------|--------------------------------------|
| | Key Learning Outcomes | | | |
| 1. Agriculture in Samoa | History and the importance of agriculture | Agricultural ecosystem | Managed and unmanaged ecosystem | Agricultural ecosystem |
| 2. Variation and Genetic | Differences between crop varieties and breeds of livestock's | Variation and Genetics | Use of Genetics | Genetically modified organisms (GMO) |

STRAND 2: Soil

MAJOR LEARNING OUTCOME

Students are able to demonstrate knowledge and understanding of importance of soil.

| SUB-STRANDS | YEAR 9 | YEAR 10 | YEAR 11 | YEAR 12 |
|--------------------|-----------------------|-----------------------------|---------------------------|-------------------------------|
| | Key Learning Outcomes | | | |
| Importance of soil | Concepts of soil | How soil provide nutrients? | Soil fertility management | Soil fertility and management |
| | Local soil | Soil properties | Soil conservation | Soil conservation |
| | | Changing soil properties | | |
| | | Use of fertilizers | | |

STRAND 3: Farm Management, Economics and Marketing

MAJOR LEARNING OUTCOME

Students are able to demonstrate knowledge and understanding of managing resources, manage their resources economically and how to market products.

| SUB-STRANDS | YEAR 9 | YEAR 10 | YEAR 11 | YEAR 12 |
|------------------------------------|-----------------------|----------------------------|-------------------------|-----------------------|
| | Key Learning Outcomes | | | |
| 1. Managing resources | Farm manager | Budgeting | Farm management | Record keeping |
| | Record keeping | Decision making | | |
| 2. Managing resources economically | Economic concepts | Preparation of records | Use of records | Management |
| | Marketing issue | Gross margins | Farm production | |
| | | Process of market research | Production Management | |
| | | | Agricultural marketing | |
| Exporting of products | | | | |
| 3. Marketing products | Target market | Market research | Marketing planning | Marketing of products |
| | | | Processing of a product | |

STRAND 4: Crop Production

MAJOR LEARNING OUTCOME

Students are able to demonstrate knowledge and understanding of crop production, plant features, growth management and plant process.

| SUB-STRANDS | YEAR 9 | YEAR 10 | YEAR 11 | YEAR 12 |
|-----------------------------|-------------------------------|-------------------------------------|------------------------------|------------------------|
| | Key Learning Outcomes | | | |
| 1. Crop Production in Samoa | Importance of crop production | Factors influencing crop production | Importance of agro-forestry | Plant growth practical |
| | | Organic farming | | |
| 2. Plant features | External plant structure | Features of plants | Internal Plant structure | |
| 3. Growth management | Managing plant growth | Managing plant growth | Manage plant growth | Manage plant growth |
| | | Practical | Practical | |
| 4. Plant processes | Seed and germination | Plant reproduction | Manipulation of plant growth | Reproduction |
| | Transpiration | Role of plants in nutrient cycles | Transport of materials | |
| | | Photosynthesis | | |

STRAND 5: Animal Production

MAJOR LEARNING OUTCOME

Students are able to demonstrate knowledge and understanding of livestock breeds and systems, management practices, growth & reproduction, animal health and nutrition & feeding.

| SUB-STRANDS | YEAR 9 | YEAR 10 | YEAR 11 | YEAR 12 |
|------------------------------------------|--------------------------------------|---------------------------------|--------------------------------------------|-----------------------------------------------------|
| | Key Learning Outcomes | | | |
| 1. Breeds and system | Animal production | Pig production | Cattle and pig production | Cattle, pig and chicken production |
| | Poultry products and raising systems | Pig breeds and rearing systems | Cattle and pig breeds and raising systems | Use of livestock breeds |
| 2. Management practices - animal welfare | Management of chickens | Management of pigs | Management of pigs and cattle | Management of cattle, pigs and chickens |
| 3. Growth and reproduction | Growth of chicken | Reproduction and growth of pigs | Reproduction and growth of pigs and cattle | Reproduction and growth of cattle, pigs and chicken |
| 4. Animal Health | Health of chicken | Health of pigs | Health of cattle and pigs | Health of cattle, pigs and chickens |
| 5. Nutrition and feeding | Nutrition and feeding of chickens | Nutrition and feeding of pigs | Nutrition and feeding of pigs and cattle | Nutrition and feeding of cattle, pigs and chickens |

STRAND 6: Tools, Equipment and Facilities

MAJOR LEARNING OUTCOME

Students are able to demonstrate knowledge and understanding of importance of tools, equipment and facilities.

| SUB-STRANDS | YEAR 9 | YEAR 10 | YEAR 11 | YEAR 12 |
|-----------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|
| | Key Learning Outcomes | | | |
| Safe use and maintenance of tools | Safe use of tools, equipment and facilities | Safe use of tools, equipment and facilities | Safe use of tools, equipment and facilities | Safe use of tools, equipment and facilities |



Agricultural Science

Strands, Sub-strands and Specific Learning Outcomes

STRAND 1: AGRICULTURE

MAJOR LEARNING OUTCOME

- SUB- STRANDS
1. Agriculture in Samoa
 2. Variation and genetics.

From their study of AGRICULTURE students will understand:

| SUB-STRAND | YEAR 9 | YEAR 10 | YEAR 11 | YEAR 12 |
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| 1. AGRICULTURE IN SAMOA | <p>The history and importance of agriculture when they:</p> <ul style="list-style-type: none"> Investigate a key aspect of the history of agriculture in Samoa (plan and formulate a question, identify sources of information (primary and secondary), gather information, process information, interpret, report). Explain the links between history and present day agriculture e.g., taro blight and present day production. Describe the importance of agricultural activities for individuals and their communities e.g., food, economic, social, cultural, religious. Describe the effects of Climate Change on agriculture. | <p>Agricultural systems in Samoa when they:</p> <ul style="list-style-type: none"> Investigate a system of agriculture used locally and its associated technology e.g., shifting cultivation, Subsistence, semi-subsistence, mono-cropping, mixed farming, commercial farming, cash cropping, organic farming. Investigate trends in local production e.g. changes in the amount of a product, types of products. Summarise the advantages and disadvantages of a range of the agricultural systems used. Explain the consequences of agricultural systems on the land and production. Discuss the importance and influence of understanding Climate Change in relation to Agriculture System and Agricultural practices. | <p>Managed ecosystems when they:</p> <ul style="list-style-type: none"> Compare the features of managed and natural ecosystems e.g., variety of species, nutrient cycles, balance, food webs. Investigate a method used to maintain or increase production or returns e.g., new varieties, fertiliser, organic farming, niche crops, crop rotation. Investigate a regional or global issue relating to managed ecosystems e.g. global warming, erosion, deforestation, pests, water sources, chemical use. Evaluate the effectiveness of methods used to maintain or increase production or returns. Evaluate the impact of the long term use of an agricultural practice on a managed ecosystem e.g., environmental impact, social impact. Investigate the possible impact of Climate Change on the managed ecosystem e.g., sustainable farming. | <p>Agricultural ecosystems when they:</p> <ul style="list-style-type: none"> Describe the characteristics of an ecosystem e.g., producer, consumer, decomposer. Describe the differences between a managed and a natural ecosystem. Describe the types of agricultural management system - traditional, mixed farming, inter-cropping, mono cropping, organic farming, integrated pest management (IPM), agro forestry. Investigate local and regional impact of Climate Change on Agriculture ecosystems e.g., deforestation leads to increase in temperature. Investigate adaptation measures of Climate Change locally and regionally e.g., Food security, Agro forestry project. |

Students will be able to investigate and develop their skills and understanding of:

| SUB-STRAND | YEAR 9 | YEAR 10 | YEAR 11 | YEAR 12 |
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| <h2>2. VARIATION / GENETICS</h2> | <p>Differences between crops and breeds when they:</p> <ul style="list-style-type: none"> • Compare the characteristics of various types of crop varieties and breeds of livestock. • Identify varieties of vegetables, root crops and native medicinal plants. • Identify breeds of chickens, cattle, sheep, goat found in Samoa. • Identify varieties and breeds adaptable to changes in climate change. <i>eg., taamu – gaint taro, native pigs, pulaa – high salinity.</i> • Define GMO | <p>Students will be able to investigate and develop their skills and understanding of:</p> <p>Variation of characteristics Genet-ics when they:</p> <ul style="list-style-type: none"> • Discuss advantage and disadvantage of GMO. • Process and interpret information on the variation in a physical characteristic of a crop variety or livestock breed <i>eg., leaf size of taro, egg size and shape, coat colour of cattle, flower colour.</i> • Discuss causes of variation in the characteristics of a crop variety or livestock breed <i>eg., environmental (effects of nutrient deficiencies), genetic (gene for tallness).</i> • Use genetic charts to identify the possible characteristics of the offspring from a simple monohybrid cross <i>eg., family trees, punnet squares, genotypes, phenotypes, height, coat colour, horns, flower colour, seed shape.</i> • Relate the principles of variation and genetics to crop and animal production. | <p>The use of genetics when they:</p> <ul style="list-style-type: none"> • Use genetic charts to solve problems relating to monohybrid crosses <i>eg., test cross, back cross.</i> • Discuss following terms dihybrid, multiple punnet square. • Explain how knowledge of genetics is used in crop and livestock production and breeding <i>eg., improvement, selection.</i> • Explain improvements in production as a result of breeding eg heritability, line breeding, cross breeding, cross breeding and hybrid. • Discuss relationship of GMO to climate change. | <p>Genetically modified foods when they:</p> <ul style="list-style-type: none"> • Investigate benefits of GMO genetically modified organisms (GMO). • Investigate reasons for and against GMO. • Investigate impact of GMO. • Discuss impacts of GMO. |

| STRAND 2: Soil | | | | | |
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| MAJOR LEARNING OUTCOME | | YEAR 9 | YEAR 10 | YEAR 11 | YEAR 12 |
| SUB-STRAND | From their study of SOILS students will understand: | | | | |
| | | Students will be able to investigate and develop their skills and understanding of: | | | |
| | <p>The concepts of soil when they:</p> <ul style="list-style-type: none"> • Explore the concept of soil as a natural resource e.g., what is soil, soil fertility linked to civilisation. • Discuss the importance of soil in relation to plant growth. • Introduce the concept, components of soil, organism, texture & structure. <p>The local soil when they:</p> <ul style="list-style-type: none"> • Investigate the components and properties of a local soil e.g., air, water, nutrients, organisms, texture, structure. • Summarise information to explain how local soil is formed. • Explore, draw and label a soil profile. • Explore various concept of soil. • Explain relationship of soil fertility and civilisation. | <p>How soil provides nutrients for plant growth when they:</p> <ul style="list-style-type: none"> • Investigate the effects of macro or micro-nutrients on plant growth. • Describe the functions of nutrients and identify plants showing the symptoms of nutrient deficiencies e.g. N, P, K, Mg, Fe and Ca. <p>Soil properties when they:</p> <ul style="list-style-type: none"> • Describe the effects of the chemical properties of soils on plant growth e.g. composition, ion exchange, pH. • Describe the effects of the physical properties of soils on plant growth e.g. texture, structure, colour, consistency, bulk density, porosity. • Describe the biological properties of soils e.g. microorganisms, earthworms. <p>The changing of soil properties when they:</p> <ul style="list-style-type: none"> • Investigate an aspect of the chemical, physical or biological properties of a soil sample. | <p>Soil fertility management when they:</p> <ul style="list-style-type: none"> • Carry out an investigation to determine a soil's fertility e.g. colour, indicator plants, soil analysis. • Present ideas relating to the improvement of soil fertility e.g. liming, fertilisers. • Describe the role of micro-organisms in changing soil fertility. <p>Soil conservation when they:</p> <ul style="list-style-type: none"> • Evaluate the effects of land use on soil properties e.g. cropping systems, animal production. • Apply the principles of soil conservation to suggest appropriate soil management strategies e.g., farming practices, water management, controlling soil erosion. • Discuss the impact of climate change on soil conservation e.g., rainfall, changes in the weather. • Discuss the method of adaptation in farming practices water management and controlling soil erosion. | <p>Soil fertility and management when they:</p> <ul style="list-style-type: none"> • Investigate the properties of a soil in terms of physical (texture, structure, colour), chemical (pH, nutrient status), biological (micro and macro organisms; nitrogen fixing bacteria and legumes) and origin (volcanic, coral). • Investigate how composting/mulching (organic content; structure; texture; nutrient status). • Investigate how liming (pH; structure; nutrient status) affect soil structure. • Investigate how organic fertilizers e.g., animal manure, green manure (nutrient status), inorganic fertilizers (nutrient status; micro/macro organisms) affect soil structure. • Investigate how irrigation and drainage (nutrient status; micro / macro organisms), tillage (structure), crop rotation (micro/macro organisms; nutrient status), herbicides (micro/macro organism, nutrients status). | |
| | 1. THE IMPORTANCE OF SOILS | | | | |

| SUB-STRAND | YEAR 9 | YEAR 10 | YEAR 11 | YEAR 12 |
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| <p style="text-align: center;">1. THE IMPORTANCE OF SOILS</p> | | <p>Students will be able to investigate and develop their skills and understanding of:</p> <ul style="list-style-type: none"> • Explain how and why people change soil properties e.g., increase pH for a different plant, use of legumes. <p>The use of fertilisers when they:</p> <ul style="list-style-type: none"> • Explain how different fertilisers provide nutrients for plant growth e.g., organic, mulch, compost, blood and bone, inorganic, (NPK). • Prepare and use an organic fertilizer/compost e.g., select suitable material, site selection, determine when it is ready to use, evaluate the results of its use. • Describe the effects of fertilizers on soil e.g., changes of properties. • Discuss how mineral soil provides nutrients for plant growth. • Compare effects of organic/ inorganic fertilizers on water holding capacity and plant response. | | <ul style="list-style-type: none"> • Investigate how overgrazing/burning/ deforestation (nutrient status; micro/ macro organisms) affect soil properties. • Investigate the effect decomposers and earth worms on soil texture and structure. • Investigate different types of growth media in seed raising and potted plants. • Investigate the technique appropriate for climate change impacts on soil (organic materials, sustainable farming practice, use of tolerant varieties and breeds). <p>Soil conservation when they:</p> <ul style="list-style-type: none"> • Evaluate the effects of different techniques of soil conservation e.g., terrace, cover crops, mechanical barriers. |

STRAND 3: FARM MANAGEMENT, ECONOMICS AND MARKETING

| SUB-STRANDS | | YEAR 9 | YEAR 10 | YEAR 11 | YEAR 12 |
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| <p>From their study of FARM MANAGEMENT, ECONOMICS AND MARKETING students will understand:</p> <p>MAJOR LEARNING OUTCOME</p> <p>1. How better to manage their resources 2. How to manage their resources economically 3. How to market products</p> | | <p>Students will be able to investigate and develop their skills and understanding of:</p> | | | |
| SUB-STRAND | 1. MANAGING RESOURCES | <p>Being a farm manager when they:</p> <ul style="list-style-type: none"> Explain the role of a farm manager e.g., <i>labour management, record keeping, decision making process, financial management.</i> Explain possible impacts of Climate Change in farm productivity and profitability. <p>The importance of record keeping when they:</p> <ul style="list-style-type: none"> Explain the importance of keeping records e.g., <i>planning, forecasting.</i> Investigate types of records e.g., <i>production, financial, labour.</i> Keep accurate record e.g., <i>production records.</i> | <p>Budgeting when they:</p> <ul style="list-style-type: none"> Explain the advantages of budgeting in relation to allocation of resources. Prepare a realistic budget for a farm-enterprise considering impacts of Climate Change. <p>Decision-making when they:</p> <ul style="list-style-type: none"> Utilise partial budgeting in decision making and planning. Utilise records in decision making e.g., <i>forecasting trends.</i> | <p>Farm management when they:</p> <ul style="list-style-type: none"> Determine the type of enterprise to operate based on partial budgeting and gross margin analysis. Determine and compare type of costs e.g., <i>total cost, fixed cost, variable cost, marginal cost/ cost of Climate Change impact.</i> | <p>Record keeping when they:</p> <ul style="list-style-type: none"> Investigate the role of record keeping in the management and effects of Climate Change of an agricultural enterprise. Report the findings of their investigation using charts and graphs. Use records to forecast production using the moving averages method. |
| | 2. MANAGING RESOURCES ECONOMICALLY | <p>Economics concepts when they:</p> <ul style="list-style-type: none"> Explain what agricultural economics is about e.g., <i>scarcity, choice, demand, supply, price.</i> Describe the concept of opportunity cost e.g., <i>cost of growing a crop for home use or purchasing from the market.</i> Investigate what resources are needed to produce a commodity e.g., <i>land, labour, capital.</i> | <p>The preparation of records when they:</p> <ul style="list-style-type: none"> Prepare and design a record sheet for a farming activity e.g., <i>individual animal record, cows breeding, financial record.</i> Keep accurate records in a structured format e.g., <i>individual animal record.</i> Keep accurate records in a systematic structured format e.g., <i>tables, sheets.</i> | <p>The use of records when they:</p> <ul style="list-style-type: none"> Design a record-keeping system for an agricultural activity e.g., <i>field crops, livestock production.</i> Use records to predict returns and suggest areas for improvement to management practices. | <p>Management when they:</p> <ul style="list-style-type: none"> Investigate the factors that influence management decisions. Investigate goals and aspirations of the manager human resources, physical resources, financial resources. |

| SUB-STRAND | YEAR 9 | YEAR 10 | YEAR 11 | YEAR 12 |
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| <p>2. MANAGING RESOURCES ECONOMICALLY</p> | <p>Marketing issues when they:</p> <ul style="list-style-type: none"> Investigate a product (e.g., ginger, banana, coconuts, cucumber, dwarf beans, Chinese cabbage, laupele) sold in the local market to determine marketing issues e.g., price, quality, quantity, packaging, presentation, frequency of sale. Report the findings of their investigation using charts and graphs. | <p>Students will be able to investigate and develop their skills and understanding of:</p> <p>Gross margins when they:</p> <ul style="list-style-type: none"> Determine the gross margin of a commodity or livestock e.g., cocoa, taro, beans, cattle, pigs, poultry. Use the gross margin as an economic tool in decision-making e.g., selecting an enterprise. | <p>Students will be able to investigate and develop their skills and understanding of:</p> <p>Farm production when they:</p> <ul style="list-style-type: none"> Explain the production function of an enterprise. Determine the best stage of production for a given enterprise. Investigate input-output relationships e.g., effects of fertiliser on yield, effects of irrigation on yield. <p>Production management when they:</p> <ul style="list-style-type: none"> Determine maximum, optimum and break even points of production. Investigate the best point of production. Explore input-output relationships e.g., effects of fertiliser and irrigation on production. <p>Agricultural marketing when they:</p> <ul style="list-style-type: none"> Prepare a local promotional program for a product. Develop a marketing channel for a product exported from Samoa. <p>The exporting of a product when they:</p> <ul style="list-style-type: none"> Investigate the planning and price structure for an export product e.g., banana, coconut. Investigate requirements by bio security for agricultural produces for export. Report the findings of their investigation using charts and graphs. | <p>Students will be able to investigate and develop their skills and understanding of:</p> <ul style="list-style-type: none"> Investigate role of financial institutions e.g., development banks and banks, storage systems, sustainability (economic and environment), market opportunities. Investigate land tenure and Climate Change Impact. |

STRAND 3: FARM MANAGEMENT, ECONOMICS AND MARKETING

| SUB-STRAND | YEAR 9 | YEAR 10 | YEAR 11 | YEAR 12 |
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| 3. MARKETING PRODUCTS | <p>Target markets when they:</p> <ul style="list-style-type: none"> Identify potential products to be marketed. Give reasons for the selection of a target market for the identified products. Give reasons for the selection of a target market for the identified products. | <p>Market research when they:</p> <ul style="list-style-type: none"> Explain what market research is about. Give examples of the use of local market research. Carry out market research of a product (e.g., tomato, head cabbage, long beans, maize, taro, yams, coffee, avo) sold in the local market. Report the findings of their market research using charts and graphs. | <p>Market planning when they:</p> <ul style="list-style-type: none"> Plan the marketing of a product e.g., identification of physical attributes, price, consistency of product (quality, taste, packaging), continuity of supply. Analyse the price structure of a product e.g., methods of setting prices, price policies, and strategies. Explore quarantine requirements for agricultural exports. <p>The processing of a product when they:</p> <ul style="list-style-type: none"> Investigate marketing channels and promotion of a processed product for export e.g., coconut cream, avo, cocoa. Report the findings of their investigation using charts and graphs. | <p>Marketing of products when they:</p> <ul style="list-style-type: none"> Investigate the market opportunities available for a product e.g., papaya, ulu, banana and taro. Investigate post harvesting handling steps used to meet local and/or export market requirements for the product. Including these requirements: <ol style="list-style-type: none"> Quality control to meet regulatory requirements e.g., grading system. Quarantine requirements e.g., Inferior quality (rejected products). Pricing and market prices. Economics of production. Investigate how processing can add value to a local primary product. Identify and describe the marketing roles of agricultural grower organizations e.g., identify potential market. Report findings of their investigation using graphs, tables and charts. |
| | <p>Students will be able to investigate and develop their skills and understanding of:</p> | | | |

STRAND 4: CROP PRODUCTION

SUB-STRANDS

1. Crop production in Samoa
2. Plant features
3. The management of plant growth
4. Plant processes

MAJOR LEARNING OUTCOME

From their study of CROP PRODUCTION students will understand:

| SUB-STRAND | YEAR 9 | YEAR 10 | YEAR 11 | YEAR 12 |
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| 1. CROP PRODUCTION | <p>The importance of crop production when they:</p> <ul style="list-style-type: none"> • Explain the importance of plant crops to the people of Samoa e.g., <i>vegetables, fruits, animal feed, clothing.</i> • Interpret information relating to crop production e.g., <i>export trends, types of crops.</i> • Interpret information on change of climate, e.g., <i>rainfall pattern/ humidity, temperature, etc.</i> | <p>The factors influencing crop production when they:</p> <ul style="list-style-type: none"> • Investigate factors affecting crop production e.g., <i>light, nutrients, pests.</i> • Process and interpret information on an environmental factor influencing land use for crop production e.g., <i>season, altitude.</i> <p>The use of organic farming when they:</p> <ul style="list-style-type: none"> • Investigate management practices used in organic farming e.g., <i>soil building, crop rotation, use of post-harvest handling procedures, control of pest and disease through resistance varieties, inter-cropping, guard rows, repellents.</i> • Investigate organic farming as a farming tool to compact Climate Change e.g., <i>resistant variety.</i> | <p>The importance of agro-forestry when they:</p> <ul style="list-style-type: none"> • Investigate the features of a range of natural and managed forests e.g., <i>location, environment, species present.</i> • Process and interpret information on an aspect of agro-forestry e.g., <i>trends products, land use.</i> • Investigate important of agro/forestry in reducing Climate Change. | <p>Grow plants when they:</p> <p>PRACTICAL</p> <ul style="list-style-type: none"> • Demonstrate asexual reproduction e.g., <i>marcotting/ air layering, grafting, budding and tissue culture.</i> |
| | Students will be able to investigate and develop their skills and understanding of: | | | |

| STRAND 4: CROP PRODUCTION | | | | |
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| SUB-STRAND | YEAR 9 | YEAR 10 | YEAR 11 | YEAR 12 |
| | Students will be able to investigate and develop their skills and understanding of: | | | |
| 2. PLANT FEATURES | <p>External plant structure when they:</p> <ul style="list-style-type: none"> Describe the functions of the main parts of a plant e.g., <i>flower, bud, stem, root, leaves.</i> Compare the features of plants used in crop production e.g., <i>types of aroids, yams, fruits, timber trees, banana.</i> Compare the features of monocotyledon and dicotyledon plants. | <p>The features of plants when they:</p> <ul style="list-style-type: none"> Classify samples of plants into major groups e.g., <i>ferns, flowering plants, cone bearing plants.</i> Investigate how people use the features of plants in crop production. Link the features of plants with their uses e.g., <i>poumuli has a straight trunk and is used for fale posts, banana produces fruit used for food, pandanus leaves have fibres that are used for mats.</i> | <p>Internal plant structure when they:</p> <ul style="list-style-type: none"> Investigate the internal structure of stems, roots and leaves e.g., <i>cell types, tissue arrangements.</i> Link features of the internal structure of plants to their function e.g., <i>long xylem vessels linked to transport of water, fibres linked to support, living phloem cells to transport.</i> | |
| | <p>Manage plant growth when they:</p> <ul style="list-style-type: none"> Explain the importance of good management of crop production e.g., <i>increased food production and net return.</i> Use knowledge of drainage and irrigation to optimise plant growth e.g., <i>hose, sprinklers, channels, mulch, raised beds.</i> Use knowledge of weeds, plant pests and diseases to improve crop growth. | <p>Manage plant growth when they:</p> <ul style="list-style-type: none"> Use knowledge of ways to provide support of plants to optimise growth e.g., <i>A frames, stakes, fencing, parallel strings.</i> Use knowledge of weed control to optimise plant growth e.g., <i>effect of weeds, biological control, chemical control.</i> Use knowledge of the control of plant pests and diseases to optimise growth. | <p>Manage plant growth when they:</p> <ul style="list-style-type: none"> Use knowledge of pruning to optimise plant growth e.g., <i>removal of shoots, terminal parts.</i> Use knowledge of intercropping and mixed cropping to improve crop growth and yield. Use knowledge of pests and disease-causing agents and the damage they cause, to minimise production losses. | <p>Manage plant growth when they:</p> <ul style="list-style-type: none"> Investigate the main groups of pest and disease and the effects they have on crops e.g., <i>pests - insects and mites, slugs and snails and vertebrates (rats, bats, birds); disease - fungus, bacteria, viruses and nematodes.</i> Investigate the behaviour of an insect at different stages of its life cycle to its control, damage and spread e.g., <i>incomplete metamorphosis (egg, nymph and adult), incomplete metamorphosis (egg, larvae, pupa, adult), gradual metamorphosis.</i> |
| 3. GROWTH MANAGEMENT | | | | |

| SUB-STRAND | YEAR 9 | YEAR 10 | YEAR 11 | YEAR 12 |
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| <p style="text-align: center;">3. GROWTH MANAGEMENT</p> | <ul style="list-style-type: none"> • Discuss vegetable products farming practises suitable to weather condition e.g., <i>ped - pedation, drainage, mounding, ped gardening.</i> • Use knowledge of preparation and storage of seeds and fruits to ensure quality material for sale, food or planting. <p>PRACTICAL</p> <ul style="list-style-type: none"> • Grow cucumber, dwarf beans, Chinese cabbage, eggplant, green pepper, ginger, water cress, water melon and laupele for market or home use. • Assist with production of the field crops: ginger, banana, cocoa, pineapple, pawpaw, lime, kava, nonu and coconuts for market or home use export. | <p>Students will be able to investigate and develop their skills and understanding of:</p> <ul style="list-style-type: none"> • Use knowledge of preparation and storage of seeds and fruits to ensure quality material for sale, food or planting. <p>PRACTICAL</p> <ul style="list-style-type: none"> • Grow tomato, head cabbage, long beans, and maize/corn for market or home use. • Assist with production of the field crops taamu, yam, ava and coffee for market or home use. • Use knowledge of integrated pest management to plan a control program e.g., <i>cultural, physical, chemical, biological, varietal, regulatory.</i> | <ul style="list-style-type: none"> • Grow a range of vegetable products for market or home use. <p>PRACTICAL</p> <ul style="list-style-type: none"> • Grow range of root crops for market or home use. • Grow a range of vegetables and root crops for market or home use, using Agro forestry practices. | <p>Students will be able to investigate and develop their skills and understanding of:</p> <ul style="list-style-type: none"> • Explain the economic reasons for controlling pest and disease in relation to product e.g., <i>quality, quantity/yield, movement/trade.</i> • Describe pest and disease control measures, and the impact they have on target organisms and the wider production system e.g., <i>crop rotation, pesticides, cultural practices, physical control, biological control, integrated pest management.</i> • Investigate how regulations affect management of agricultural enterprises e.g., <i>quarantine, environment laws and regulatory control (tariff, tariff barriers, quota).</i> • Investigate the role of bio-security in protecting agricultural and the natural environment e.g., <i>safety measures, regulations (phytosanitary certificates, import/export permits).</i> • Investigate how seed germination is affected by the environment (oxygen, water, and temperature), dormancy and viability (storage and quality). • Investigate how growth and development in plants is influenced by nutrients, the environment, hormones, training, and weeds. • Explain how the growth, development and sexual reproduction of plants to produce a quality product is affected by cultivar, light, water, nutrients, pruning and training, pollination, plant hormones and growth regulators. • Investigate impact of Climate Change on farming system in Samoa e.g., <i>traditional farming, hydroponics, Agro forestry, zero tillage.</i> |

| STRAND 4: CROP PRODUCTION | | | | | |
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| SUB-STRAND | YEAR 9 | YEAR 10 | YEAR 11 | YEAR 12 | |
| PLANT PROCESSES | <p>Seeds and germination when they:</p> <ul style="list-style-type: none"> Investigate the seed structure of a range of plants and compare the development of various fruit and seeds types. Carry out an investigation into a factor that affects germination e.g., <i>viability, nature of germination, effect of environmental factors (temperature, air, moisture, light).</i> Investigate plant production in controlled conditions e.g. <i>plant density, light intensity in green houses, shading.</i> Summarise information on the germination of the seeds of a named plant. <p>Transpiration when they:</p> <ul style="list-style-type: none"> Investigate the effect of Climate Change on plant transpiration e.g., <i>increase temperature water/rainfall.</i> Investigate the effects of transpiration e.g., <i>water loss, wilting.</i> Explain the role of transpiration in the water cycle. | <p>Plant reproduction when they:</p> <ul style="list-style-type: none"> Investigate flower structure in a range of plants e.g., <i>wind pollinated, insect pollinated.</i> Investigate the impact of Climate Change on pollination, fertilization, asexual propagation and photosynthesis. Describe the processes of pollination and fertilisation and their functions. Investigate methods of asexual reproduction e.g., <i>budding, grafting.</i> <p>Role of plants in nutrient cycles when they:</p> <ul style="list-style-type: none"> Investigate the role of plants in nutrient cycles e.g., <i>carbon cycle, nitrogen cycle.</i> Outline the role of plants in the carbon and nitrogen cycles e.g., <i>respiration, photosynthesis, nitrogen fixing in legumes.</i> Investigate the role of plants in using carbon in reducing Climate Change. <p>Photosynthesis when they:</p> <ul style="list-style-type: none"> Investigate the importance of photosynthesis to crop production. Explain the link between photosynthesis, plant growth and crop production. | <p>The manipulation of plant growth when they:</p> <ul style="list-style-type: none"> Explain how production is improved through use of a variety of methods e.g., <i>variety selection, controlled pollination, hybridisation, asexual reproduction.</i> Develop management procedures used to ensure seed viability e.g., <i>storage seed treatment.</i> <p>The transport of materials by plants when they:</p> <ul style="list-style-type: none"> Investigate an aspect of water or nutrient movement in plants. Describe water and nutrient movement in plants in terms of absorption, transpiration, and translocation. Investigate the effect of Climate Change on absorption, transpiration and translocation. e.g., <i>drought reduces soil water temperature variation.</i> | <p>Reproduction when they:</p> <ul style="list-style-type: none"> Explain how asexual reproduction is used to maintain purity of line and increase plant numbers. Discuss the use of asexual reproduction to increase trees and fruit trees to compact Climate Change | <p>Students will be able to investigate and develop their skills and understanding of:</p> |
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STRAND 5: ANIMAL PRODUCTION

SUB-STRANDS

1. The importance of livestock breeds and systems
2. Correct handling and welfare management practices
3. Management of growth and reproduction
4. Management of animal health
5. Management of nutrition and feeding

MAJOR LEARNING OUTCOME

From their study of ANIMAL PRODUCTION students will understand:

SUB-STRAND

YEAR 9

YEAR 10

YEAR 11

YEAR 12

Students will be able to investigate and develop their skills and understanding of:

| SUB-STRAND | YEAR 9 | YEAR 10 | YEAR 11 | YEAR 12 |
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| 1. BREEDS AND SYSTEMS | <p>Animal production when they:</p> <ul style="list-style-type: none"> • Explain the importance of livestock production to individuals e.g., protein food, income. • Discuss 2 types of poultry production e.g., meat broiler, layers. • Describe how a range of factors are important in animal production e.g., shelter, breeding, water. <p>Poultry products and raising systems when they:</p> <ul style="list-style-type: none"> • Explain the importance of the products each chicken breed produces e.g., meat, eggs, feather. • Describe different systems of raising poultry e.g., free range. • Investigate the effects of Climate Change on raising chicken. | <p>Pig production when they:</p> <ul style="list-style-type: none"> • Explain the importance of pigs to the village community e.g., cultural, religious, and social. <p>Pig breeds and rearing systems when they:</p> <ul style="list-style-type: none"> • Describe the characteristics of different pig breeds. • Summarise the advantages and disadvantages of various systems of rearing pigs e.g., free range intensive, semi intensive. • Evaluate the use of different pig breeds to produce particular products. • Give reasons for the selection of a pig breed for a local farm e.g., fast growth adaptability to local condition. • Investigate the effects of Climate Change on raising pigs. | <p>Cattle and pig production when they:</p> <ul style="list-style-type: none"> • Explain the importance of cattle breeds in different production systems e.g., cattle - tethering • Discuss 2 types of cattle production (e.g., meat, income, religious, social culture): beef/meat; dairy. <p>The use of livestock breeds when they:</p> <ul style="list-style-type: none"> • Analyse how to improve livestock production in Samoa e.g., crossbreeding, husbandry management. • Evaluate the use of different cattle breeds to produce particular products. • Justify the selection of cattle breeds for different farming practices. • Discuss the importance of breeding programme of cattle that is suitable for climate change. <p>Cattle breeds and raising systems when they:</p> <ul style="list-style-type: none"> • Evaluate different sizes cattle enterprises e.g., small holder enterprises. • Compare the characteristics of different types and breeds of cattle e.g. <i>Bos indicus</i>, <i>Bos taurus</i>, <i>Hereford</i>, <i>Drought Master</i>. • Justify the selection of cattle breeds for different farming practices. • Investigate the effects of Climate Change on raising cattle. | <p>Cattle, pig and chicken production when they:</p> <ul style="list-style-type: none"> • Evaluate the systems used for raising livestock. • Evaluate feeding and grazing systems. <p>The use of livestock breeds when they:</p> <ul style="list-style-type: none"> • Evaluate the characteristics of local and commercial breeds. • Evaluate local and commercial feedings for pig, chicken and cattle. |

| STRAND 5: ANIMAL PRODUCTION | | | | |
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| SUB-STRAND | YEAR 9 | YEAR 10 | YEAR 11 | YEAR 12 |
| 2. MANAGEMENT AND ANIMAL WELFARE | Students will be able to investigate and develop their skills and understanding of: | | | |
| | <p>The management of chickens when they:</p> <ul style="list-style-type: none"> Carry out procedures safely to minimise stress to the animal welfare e.g., holding, debeaking, feeding, determining sex. Assist with procedures safely and efficiently e.g., grade eggs, making feed troughs. Investigate the procedures used to slaughter and dress a chicken to standards fit for human consumption. Investigate sustainable practises for raising chickens for suitable for Climate Change e.g., proper housing and shelters. | <p>The management of pigs when they:</p> <ul style="list-style-type: none"> Carry out procedures safely to minimise stress to animal welfare e.g., holding, feeding, identification (ear notching, ear tagging, clipping teeth). Assist with procedures safely and efficiently e.g., fencing. Investigate the procedures used to slaughter and dress a pig to standards fit for human consumption. | <p>The management and cattle when they:</p> <ul style="list-style-type: none"> Carry out procedures safely with minimum stress to the animal e.g., castration, iron injection, mating, drenching. Analyse handling procedures and systems to identify and suggest possible improvements. Evaluate and apply regulations and laws set by MAF concerning meat preparation e.g., abattoirs. Carry out procedures safely with minimum stress to the animal e.g., yarding, roping, feeding, identification (branding, ear tagging, tattooing). Assist with procedures safely and efficiently e.g., fencing (post and wire, electric) pasture management, weed control. Investigate the procedures used to slaughter, dress and process a cattle beast to standards fit for human consumption e.g., skinning, parts of the animal, cuts of meat. | <p>The management of cattle, pigs and chickens when they:</p> <ul style="list-style-type: none"> Carry out the husbandry practices of identification, drenching, castration, tail docking, de-beaking, trimming teeth and claws. Evaluate the effectiveness of one husbandry practice carried out on a farm that is suitable to Climate Change. |

| SUB-STRAND | YEAR 9 | YEAR 10 | YEAR 11 | YEAR 12 |
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| <p style="text-align: center;">3. GROWTH AND REPRODUCTION</p> | <p>The growth of chickens when they:</p> <ul style="list-style-type: none"> Identify and compare the features of good-layers and poor-layers. Describe the different growth stages of layers and broilers e.g. <i>time, weight gain feed.</i> Discuss the impact of Climate Change on growth and raising of broilers/ layers in Samoa. | <p>The reproduction and growth of pigs when they:</p> <ul style="list-style-type: none"> Describe the characteristics of good breeding sows and boars. Identify the parts of the pig reproductive system and describe their functions. Outline the management of pigs for increased production from before mating until after farrowing. Discuss the impact of Climate Change on growth and raising of pigs. | <p>The reproduction and growth of cattle when they:</p> <ul style="list-style-type: none"> Apply knowledge of the growth and reproduction of pigs and cattle to maximise production. Compare breeding systems and mating methods used in cattle. Describe the causes of infertility in cattle. Outline the management of cattle for increased production from before mating until after calving e.g., <i>selection of sexually matured cattle for mating, oestrus, mating ratio, identifying pregnant cows, identifying time of calving.</i> Explain management practices relating to mating and gestation e.g., <i>mating ratio, gestation period, oestrus.</i> Outline the advantages and disadvantages of artificial techniques used in animal growth and reproduction e.g., <i>artificial insemination, hormone injections.</i> Investigate sustainable management practises of cattle (beef/ dairy) that are suitable to climate change. Discuss the impact of Climate Change on growth and raising of cattle. | <p>The reproduction and growth of cattle, pigs and chicken when they:</p> <ul style="list-style-type: none"> Explain the factors that influence the growth and development of animals e.g., <i>breeds, nutritive value of feed sock, environment, husbandry practices and hygiene.</i> Explain how the manipulation of selected factors affects the growth, development and production of animals to achieve quality products e.g., <i>choice of breed, environment, animal behaviour, feeding regime, water and feed.</i> Explain how the selected factors of growth and development of animals are influenced by climate change. Explain animal reproduction strategies in maintaining purity of line and increase of productivity e.g., <i>reproductive cycle, breeding system, breeding selection criteria and genetic gain.</i> |
| | <p>Students will be able to investigate and develop their skills and understanding of:</p> | | | |

STRAND 5: ANIMAL PRODUCTION

SUB-STRAND

YEAR 9

YEAR 10

YEAR 11

YEAR 12

Students will be able to investigate and develop their skills and understanding of:

The health of chickens when they:

- Identify healthy and unhealthy birds.
- Describe the actions to be taken with unhealthy birds e.g., *isolate, treat, cull*.
- Explain the importance of keeping birds healthy.
- Demonstrate appropriate attitudes towards the care and treatment of animals.
- Investigate the effect of Climate Change on chicken health.
- Investigate the effect of feed on chicken health.

The health of pigs when they:

- Describe the symptoms of healthy and unhealthy pigs.
- Outline the procedures to be carried out with healthy and unhealthy pigs.
- Explain the importance of correct animal management to pig health e.g., *feeding, shelter, housing*.
- Demonstrate and explain appropriate attitudes towards the care and treatment of animals.
- Investigate the effect of Climate Change on pig health.
- Investigate the effect of feed on pig health.

The health of cattle when they:

- Describe common parasites and diseases and their control.
- Identify common diseases of cattle based on symptoms.
- Summarise the symptoms and control of common cattle diseases e.g., *TB, Brucellosis, Mastitis*.
- Explore the attitudes of others to the care and treatment of animals e.g., *family members, Animal Protection League*.

The health of cattle, pigs and chickens when they:

- Identify and describe pest e.g., *parasites*.
 - Identify and describe disease e.g., *mastitis, brucellosis, tuberculosis, coccidiosis*.
 - Identify and describe disorders e.g., *lameness, injury, nutritional*.
 - Identify and describe chronic respiratory disease (CRD) and disorders (lameness, injury, nutritional, starvation, dehydration, scouring, prolapse, calving/ farrowing/laying difficulties).
 - Evaluate the impact of pest and disease control measures have on target organisms and production system.
 - Explain the life cycle of parasites in a host animal.
 - Investigate the economic reasons for controlling animal pest disease and disorders.
- Impact of climate change on pest/disease of animals**
- Discuss pest/diseases infestation due to Climate Change.

4. ANIMAL HEALTH

| SUB-STRAND | YEAR 9 | YEAR 10 | YEAR 11 | YEAR 12 |
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| 5. NUTRITION | <p>The nutrition and feeding of chickens when they:</p> <ul style="list-style-type: none"> Identify the main parts of the chicken digestive system and their functions e.g., <i>crop for storage, gizzard for grinding food.</i> Investigate an aspect of the nutrition or feeding of chickens e.g., <i>behaviour, feed types, nutrients in feed.</i> Process and interpret information on the different feed requirements for different growth stages e.g., <i>amounts, nutritional value, timing.</i> Compare a variety of chicken feeds and feeding methods e.g., <i>sources of feed, sources of nutrients.</i> | <p>The nutrition and feeding of pigs when they:</p> <ul style="list-style-type: none"> Describe the functions of the main parts of the pig digestive system. Investigate an aspect of the nutrition or feeding of pigs, e.g., <i>behaviour, feed types, nutrients in feed.</i> Process and interpret information on the nutritional requirements of pigs e.g., <i>water, protein, vitamins, minerals, roughage.</i> Compare a variety of local and imported feed sources e.g., <i>cost, availability, nutrients.</i> Discuss monogastric digestive system. | <p>The nutrition and feeding of pigs and cattle when they:</p> <ul style="list-style-type: none"> Discuss the ruminant digestive systems. Investigate the preparation of a feed formula using local feeds. Process and interpret information on the nutritional requirements for different growth and reproductive stages e.g., <i>bull, lactating cow, steer, heifer, calf.</i> Describe the functions of the main parts of the cattle digestive system. Investigate an aspect of the nutrition or feeding of cattle e.g., <i>behaviour, feed types, nutrients in feed.</i> Process and interpret information on the yearly growth patterns of pastures. Compare the nutritive value of local pastures, improved pastures and locally available concentrate feeds. | <p>The nutrition and feeding of cattle, pigs and chickens when they:</p> <ul style="list-style-type: none"> Investigate local feed stock e.g., <i>types, quality, availability and quantity.</i> Investigate the nutritive value of pastures e.g., <i>local and improved.</i> Investigate the feeding regimes of animal (stages of development). Formulate a feed ration for cattle, pigs or chicken. Compare and contrast between monogastric and ruminant digestive systems. |

Students will be able to investigate and develop their skills and understanding of:

STRAND 6: TOOLS, EQUIPMENT AND FACILITIES

MAJOR LEARNING OUTCOME

From their study of TOOLS, EQUIPMENT AND FACILITIES students will be able to investigate and develop their skills and understand of:

SUB-STRANDS

1. Their safe use and maintenance

| SUB-STRAND | YEAR 9 | YEAR 10 | YEAR 11 | YEAR 12 |
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| 1. SAFE USE AND MAINTENANCE | <p>The safe use of tools, equipment and facilities when they:</p> <ul style="list-style-type: none"> • Identify the use of different types of tools and equipment e.g., <i>pliers, spade</i>. • Use appropriate tools and equipment safely and correctly e.g., <i>debeaking, soil preparation, harvesting</i>. • Explain why tools and equipment must be properly serviced and stored. • Report faults or problems with tools, equipment and facilities. | <p>The safe use of tools, equipment and facilities when they:</p> <ul style="list-style-type: none"> • Outline safety regulations for handling equipment and chemicals e.g., <i>knapsack sprayer</i>. • Use appropriate tools and equipment safely and correctly. • Select a suitable storing place for tools and equipment e.g., <i>secure, ventilated, away from reach of young children</i>. • Examine tools and equipment for faults e.g., <i>leaks, breaks</i>. • Demonstrate the correct use and storage of tools, equipment and facilities. • Calculate the amount of spray solution needed to spray a particular plot e.g., <i>correct dilution, area to cover</i>. • Evaluate the effects of pesticide sprays on the crop and the environment. • Service tools and equipment e.g., <i>knapsack sprayer, spades, knives</i>. | <p>The safe use of tools, equipment and facilities when they:</p> <ul style="list-style-type: none"> • Calibrate, use, service and store equipment safely and efficiently e.g., <i>mist blower, puffer, injector, weed eater</i>. • Differentiate the functions of equipment e.g., <i>mist blower from a knapsack sprayer</i>. • Plan a maintenance program for tools, equipment and facilities. • Develop records for the management of tools and equipment. | <p>The safe use of tools, equipment, chemicals and facilities when they:</p> <ul style="list-style-type: none"> • Demonstrate the correct use and storage of tools, equipment and chemicals. • Demonstrate the safe and correct procedures of mixing agricultural chemicals. • Demonstrate the safe and correct procedures of handling and maintenance of agricultural equipment. e.g., <i>chain saw, rotovator, tractor, weed eater</i>. • Describe the relationship of using Agricultural machine and Climate Change e.g., <i>ploughing</i>. • Investigate the impact of agricultural chemicals on Climate Change e.g., <i>contribution factor to Climate Change e.g., fertilizer/herbicides</i>. • Describe the best time and methods of applying agricultural chemical(s). • Explain why chemicals are with held during certain time of the cropping season. • Demonstrate first-aid safety procedures when contaminated by agricultural chemical(s). • Develop a positive attitude towards safety procedures in disposing chemical residue and containers. |
| | Students will be able to investigate and develop their skills and understanding of: | | | |

COMMUNICATION IN AGRICULTURE

MAJOR LEARNING OUTCOME

In their study of AGRICULTURE students should be able to participate effectively through:

SUB-STRANDS

1. Developing their oral communication skills
2. Developing their written communication skills.

| | YEAR 9 | YEAR 10 | YEAR 11 | YEAR 12 |
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| SUB-STRAND | Students will be able to investigate and develop their skills and understanding of: | | | |
| 1. ORAL | <ul style="list-style-type: none"> • Express ideas appropriately in various group activities e.g., <i>discussions, planning</i>. • Use language to ask and respond to questions, and give and respond to instructions. • Give brief explanations, descriptions, and comparisons. • Give a brief oral report of their findings from an investigation. • State and give reasons for their opinions. • Give an oral summary of the key points from an oral or written source. | <ul style="list-style-type: none"> • Speak effectively from notes in a short presentation. • Take notes from short presentations. • Discuss ideas and responses in small groups. • Ask detailed questions to gain information. • Give extended explanations, descriptions, reports or instructions. • Paraphrase. | <ul style="list-style-type: none"> • Participate in various speaking activities such as seminars, group presentations, oral reports, and debates. • Use language appropriate to a given situation or purpose. • Take notes from extended presentations. • Make critical evaluations. • Defend a point of view, applying analysis and principles. | <ul style="list-style-type: none"> • Participate in various speaking activities such as seminars, group presentations, oral reports, and debates. • Use language appropriate to a given situation or purpose. • Take notes from extended presentations. • Make critical evaluations. • Defend a point of view. |

COMMUNICATION IN AGRICULTURE

| SUB-STRAND | YEAR 9 | YEAR 10 | YEAR 11 | YEAR 12 |
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| 2. WRITTEN | <ul style="list-style-type: none"> • Use the first 2000 words, and the technical vocabulary of each topic. • Locate, extract and interpret information from appropriate materials such as signs, maps, charts, graphs, special publications, advertisements and newspapers. • Recognise the language structures that signal the logical organisation of information in: <ul style="list-style-type: none"> » definitions; » chronological sequence; » cause and effect; » instructions. • Use language to: <ul style="list-style-type: none"> » express cause and effect; » state research questions, or hypotheses; » give basic definitions • Write to express ideas in simple paragraphs to: <ul style="list-style-type: none"> » describe things in terms of their features, their qualities, the substances they are made from, their component parts, functions, behaviours, or properties e.g., the concept of "opportunity cost"; | <p>Students will be able to investigate and develop their skills and understanding of:</p> <ul style="list-style-type: none"> • Establish the use of the first 2000 words, and use the technical vocabulary of each topic. • Extract key ideas from short passages and draw conclusions. • Recognise the language structures that signal the logical organisation of information: <ul style="list-style-type: none"> » compare and contrast. • Write to compare and contrast. • Combine paragraphs to write increasingly detailed descriptions and explanations. • Write to express ideas in paragraphs to: describe things in terms of their features, their qualities, the substances they are made from, their component parts, functions, behaviours, or properties e.g., the functions of nutrients. • Explain: <ul style="list-style-type: none"> i) how something works as in a natural process e.g., the link between photosynthesis and crop production, or other process e.g., sentences are joined to form paragraphs; ii) reasons for some phenomenon e.g., the causes of variation in a breed. | <ul style="list-style-type: none"> • Introduce the use of words from the academic word list, use the technical vocabulary of each topic. • Use reference materials: locating, evaluating, selecting information. • Use a variety of sentences; simple, compound, and complex. • Recognise the language structures that signal the logical organisation of information: <ul style="list-style-type: none"> » summary, conclusion; » generalisation and examples; » hypothesis; » extended definitions; » classifications. • Write curriculum vitae, covering letters and other business related correspondence. • Write to express assumptions and conclusions. • Write to express ideas in complex paragraphs to: describe things in detail in terms of their features, their qualities, the substances they are made from, their component parts, functions, behaviours, or properties e.g., the causes of infertility in cattle. | <ul style="list-style-type: none"> • Use words from the academic word list. • Use the technical vocabulary of each topic. • Recognise the language structures that signal the logical organisation of information: <ul style="list-style-type: none"> » argument; » research reports. • Extract more detailed information and write coherent, longer texts integrating information from multiple sources. • Write argument texts: thesis statement, followed by argument, followed by conclusion. • Write research reports using illustrations, graphs or charts. • Write to express ideas in whole texts to describe things in detail in terms of their features, their qualities, the substances they are made from, their component parts, functions, behaviours, or properties e.g., the role of micro-organisms in changing soil fertility; |

| SUB-STRAND | YEAR 9 | YEAR 10 | YEAR 11 | YEAR 12 |
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| 2. WRITTEN | <ul style="list-style-type: none"> • Explain: <ol style="list-style-type: none"> how something works as in a natural process <i>e.g., how a soil is formed</i>; or other process <i>e.g., the relationship between supply and demand</i>; or reasons for some phenomenon <i>e.g., the reasons for the present trends in agriculture</i>. • Write paragraph summaries. • Write a simple but complete report of an investigation. | <p>Students will be able to investigate and develop their skills and understanding of:</p> <ul style="list-style-type: none"> • Write increasingly detailed reports of investigation | <ul style="list-style-type: none"> • Explain in detail: <ol style="list-style-type: none"> how something works as in a natural process <i>e.g., how soil properties change</i>, or other process <i>e.g., the importance of control measures for cattle diseases</i>; or reasons for some phenomenon <i>e.g., the reasons for using legumes in pastures</i>. • Write descriptive, expository and persuasive passages of increasing complexity. • Introduce the conventions of academic writing in their presentations <i>e.g., citing references in writing, quotations, presentations, bibliography</i>. | <ul style="list-style-type: none"> • Explain: <ol style="list-style-type: none"> how something works as in a natural process <i>e.g., how a mist blower works with a natural process</i>, or other process <i>e.g., how a knowledge of genetics is used</i>; or reasons for some phenomenon <i>e.g., the reasons for selection of a pig breed for a farm</i>. • Write short essays using different methods of development: comparison, extended definition, cause and effect. • Follow the conventions of academic writing in their presentations <i>e.g., citing references in writing, quotations, presentations, bibliography</i>. |

Glossary of Terms

Achievement objective

A statement of what students are expected to learn.

Curriculum

The national curriculum for Agricultural Science is the approved statement of the required learning that applies to all schools and all students.

General Aims

A statement of goals to provide purpose to the teaching and learning.

Learning outcome

A statement of the outcome of learning for the student.

Level

Groupings of Achievement Objectives. Currently the levels are linked to year levels e.g., Year 9.

Programme

All the units of work that go together to make a block of learning.

Specific Aims

These form a link from the Strand to an organised sequence of achievement objectives.

Strand

A broad grouping of related achievement objectives.

Unit

A small block of learning and assessment activities relating to one or more achievement objectives. Information on learning outcomes, learning activities, investigation skill focus, assessment and resources are included in a unit.

The following terms are used in the achievement objectives to describe what the students are expected to do.

Apply their knowledge

To use their understanding in a new situation or for solving a problem.

Carry out an investigation

To use an Agricultural Science method to find an answer to an observation or question. The method may include all or some of making observations and hypotheses, planning, gathering data or information, processing data and information, presenting information and reporting.

Classify

To sort, arrange, or place things accordingly into groups e.g., classify these as green plants and non-green plants.

Describe

To record in some way (e.g., list, sentence, drawing) the characteristics of something.

Explain

To make clear the cause or reason of e.g., explain why water particles move more quickly when heated.

Gather information

Collecting information or data, figures, and or measurements by further reading, surveying, or doing an activity.

Identify

To recognise, establish, or prove to be; naming, listing.

Interpret information

To bring out the meaning of.

Investigate

To find out about something. The method used to find out could be: surveys, measuring or collecting data, questionnaires.

Making models

Using materials or other stuff to make or design models of things or principles of Agricultural Science.

Present information

To show or tell information either by verbal or by non-verbal demonstrations.

Process information

Organise data or information into tables, charts, graphs, or any forms of display. To select the key points from a text

Report information

An account or information brought back and presented; can be written or verbal.

Use

To put into service, operate, or put into effect something.

Use punnet squares

To fill in the punnet squares (special squares used to work out the possible genotypes and the phenotypes of the offspring).

References

Recommended books, reports & websites for more information on Agriculture and Climate Change.

Books

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Soucie, E. A. (1983). Pats Educational Foundation of Micronesia Inc. Book. 243 pp.

Philpott *et al.* (2008). Agricultural Systems and Environment – June 2008.

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Syed, S. Mataio, N. (1993). Institute of Pacific Studies (IPS) and the Cook Islands Centre of the University of the South Pacific. Book 152 pages.

Thaman, R.R. (1982). Journal of Food and Nutrition. 39:3, pp 109 -121.

USP/ IERTA (2001). Proceedings of an IRETA workshop. 218 – 22 October 1999, IRETA, USP Alafua Campus. Published by the Institute for Research, Extension & Training in Agriculture (IRETA).

Reports

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IPCC, 2007, Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel of Climate Change. IPCC, Geneva, Switzerland, 104 pp.

Web Sites

Climate Change and Food Security (2010) <http://www.fao.org/climatechange/en/>

Climate Change Impacts on Melanesian Biodiversity(2009) <http://www.bishopmusuem.org/ccbm/Areas/Melanesia/Papers>

Food Security (2009) <http://www.grida.no/publications/rr/food-crisis/ebook.aspx>

Climate Change (7/2009) http://www.spc.int/sppu/images/stories/policy%20brief_7.pdf

Developing Nations (2009) <http://www.fao.org/teca>

Developing Nations (2009) <http://www.path2nz.com>

Organic Farming (2009) <http://www.ifoam.org>

Pacific Agriculture (2010) <http://libweb.hawaii.edu/libdept/scitech/agnic/index.html>

Invasive Species (2006) www.sprep.org/piln/

Selected Textbooks for Students and Teachers

Student textbooks

Certificate Agricultural Science

Akinsanmi
Longman
ISBN 0582003407

Agriculture for South Africa

Elliot, Slout
Collins Education
ISBN 0003222322

The Tropical Vegetable Garden

Messiaen
Macmillan
ISBN 0333570774

Understanding Farm Animals

Sutherland
McGraw Hill
ISBN 0070200335

Certificate Agricultural Science

Akinsanmi
Longman
ISBN 0 582 608848

Introduction to Agriculture

J. A. Sutherland
MCGRAW HILL
ISBN 007 0935394

Pig Production in the Tropics

J A Eusebio
Longman
ISBN 0582606179

Agricultural Economics and Marketing in the Tropics

J C Abbot and J P Makeham
Longman ISBN 0582603048

Milk & Beef Production in the Tropics

M A Barret & P J Larkin
Oxford University Press
ISBN 019854453

Teacher textbooks

An Introduction to Animal Husbandry in the Tropics

Payne
ELBS (Longman)
0582212758

The Science of Animals that Serve Humanity

Cambell, Lasley
McGraw Hill
0070097003

Fundamentals of Soil Science

Foth
John Wiley & Sons
ISBN 0-471-52279-1

Plant Protection in the Pacific Islands –a course for senior high-schoolers

Macpherson, Colin
SPC Plant Protection Services

Pacific Agroforestry – An information kit

Pacific Regional Agricultural Programme
SPC
982-343-038-1

Agroforestry - A Way to Better Farming

Module 1 and Module 2
I Ratukalou, T Nakalevu, J waradi, H Hertel, H Raedler,
E Reighber
MAFF Fiji
982-209-005-6

Animal Production (SPC Paravet)

Farm Management Handbook

Queensland Department of Primary Industries
Brisbane
0724217355

Livestock Husbandry Techniques

McNitt
Collins
0003831337

Farm Machinery

Hunt
(Publisher and ISBN not known)

Plant Protection in the South Pacific

An instructional manual for Secondary School Agricultural
Science Teachers
(Copies can be obtained from USP, Alafua)

Diseases and Parasites of Livestock in the Tropics

H T B Hall
Longman
ISBN 0582606187

Beef Cattle Production in the South Pacific

A teacher's manual
Produced by Aaron Kama
USP, Alafua
(Copies can be obtained from USP, Alafua)