

**1.0 Project Title:** BUILDING CAPACITY: EDUCATION, SCIENCE AND TECHNOLOGY FOR INCLUSIVE GROWTH: (The CLSU **BEST PROJECT**)

**2.0 Project Components:**

Component I: Construction of the Research, Extension and Training (RET) Complex (**RET Complex Project**)

Component II: Upgrading and Strengthening the University's Research Capability in the Breeder Sciences (**UPSURGE Project**)

Component III: Enhancement of Engineering Laboratories in Preparation for the Implementation of the Outcomes Based Education (OBE) System  
**(Engineering OBE Project)**

Component IV: Veterinary Learning Center for Epidemiology and Animal Disease Diagnostic (**VET - LEAD Project**)

Component V: Agricultural Education Enhancement through Science and Technology for Readiness in Global Economic Integration  
**(AGRI-EDU S&T Project)**

**3.0 Proponent:**

3.1. Type : Government Sector Group: State University

3.2. Name : **Central Luzon State University**

3.3. Address : Science City of Munoz, Nueva Ecija

Tel. No. (044) 456-0688

Fax No. (044) 456-5202

Email address: [clsu@clsu.edu.ph](mailto:clsu@clsu.edu.ph)

Website: <http://www.clsu.edu.ph>

**4.0. Coverage**

4.1. Location:

4.1.1. Central Luzon State University

4.1.2. Intended Beneficiaries:

Agricultural sector

Scientific community

Academic community

Private sector

Project beneficiaries

**5.0. Duration :** June - December 2014

## 6.0. Budgetary Requirements

Infrastructure Outlay	: P 46,801,000.00
Equipment Outlay	: P 27,870,000.00
<b>TOTAL</b>	<b>: P 74,671,000.00</b>

## 7.0. Contact Person

7.1. Name/Position:	<b>Dr. Ruben C. Sevilleja</b> - University President
7.2. Address:	Central Luzon State University
7.3. Phone No.:	Landline : 44-456-0688
Fax Nos. :	44-456-5102/44-456-0107
	Cell No.: 0917-859-9718
7.4. E-mail:	<a href="mailto:rcsevilleja@yahoo.com">rcsevilleja@yahoo.com</a>

## 8.0. The Project

### 8.1. Justification

The roadmap in higher education reform aims to improve efficiency, upgrade quality and enhance access to quality higher education which include among others upgrading leading SUCs to international standards and modernizing facilities of developing SUCs.

CLSU, being designated by the Commission on Higher Education (CHED) as Center of Excellence (COE) in Agriculture, Fisheries, Agricultural Engineering, Veterinary Medicine, Biology, and Teacher Education, and Center of Development (COD) in Chemistry, is continuously serving its students who come mostly from farming communities. It offers comprehensive course programs both in the graduate and undergraduate levels in agriculture, allied sciences and the arts, which serve as training ground for new breed of scientists, educators, entrepreneurs, managers, technicians, and farmers. It has produced top quality human resources and technologies that are globally competitive.

Moreover, CLSU serves as venue of training-related activities in partnership, and in cooperation with LGUs, other GOs and NGOs. Increasingly, public and private groups/organizations continue to come to CLSU for non-formal education.

The university through the years has been in the forefront of providing quality human resources and agri-based technologies. In fact, its rich experiences in academic, research, extension and training activities as well as in agribusiness projects and management courses are recognized by various levels and sectors manifested by sending their people for skill and management capability building. Hence, the University manages, conducts and accommodates research and development activities with the ultimate aim of empowering people for development.

To date, CLSU has 106 PhD holders, who aside from being full time professors also conduct researches and collaborate with the private and public sectors on matters of scientific concerns. Its strong faculty lineup is capable of transforming the minds of the individuals who ultimately become excellent both in theories and practice. Thus, CLSU continuously produces top quality graduates that can respond to the needs of the fast growing agri - based-dynamic economy.

Thus, in order to be always attuned with the modern times, there is a need to upgrade its R&D and instruction facilities to international standards.

## **8.2. Objectives**

### **8.2.1 Development Objective:**

To enhance the capability of CLSU as a partner for inclusive growth through education, science and technology, while continuing to serve as a model comprehensive institution of higher learning dedicated to service and excellence, developing quality human resources and technologies for people empowerment, global competitiveness, and sustainable development.

### **8.2.2 Immediate Objectives**

- a. To upgrade the facilities of the university in support of its R&D and instruction programs;
- b. To broaden the R&D capabilities of the university;
- c. To be the leading center that can address training needs of the different; sectors of the academe, industry, and farming communities;
- d. To enhance cooperation and collaboration with public and private institutions;
- e. To expand and diversify the pool of highly qualified professionals in the areas of research and development and teaching; and
- f. To achieve the sustainability of the different service laboratories of its program components.

## **8.3. Location**

The strategic location of Central Luzon provides a competitive advantage in academic and scientific pursuit as well as agricultural production. It is the gateway of large amount of crops and livestock to various provinces of Luzon, particularly Metro Manila. The region is not only regarded as the country's rice granary but also a production and trade center for different crops and animals. Likewise, the region has institutions and infrastructures which provide socio-economic, technological and other support services to its population.

The projects shall be located at the Central Luzon State University, Science City of Munoz, Nueva Ecija. CLSU as a premier institution of higher learning boosts itself with mature agricultural technologies and livelihood options that are ready for dissemination and utilization of its target clientele. It is also backstopped by competent and dedicated faculty and staff who could serve as resource persons during trainings and seminars, and expert/consultants in project planning and development. Moreover, the University is considered the hub for the Science City of Munoz composed of 22 research and development institutions which are all involved and linked toward agricultural and rural development in the region and beyond.

## **PROJECT COMPONENTS**

### **COMPONENT 1. Construction of the Research, Extension and Training Complex (RET Complex Project)**

**Budgetary Requirement: P30,151,000.00**

The RET Complex<sup>1</sup> will house the following laboratories and facilities:

#### **1.1. Plant Pest Diagnostic Laboratory**

As an institution that can implement a variety of technical assistance not only to students but also to farmers and entrepreneurs, CLSU undertakes quality projects suited to meet the needs of its clientele. The creation of the CLSU RET would certainly provide avenues for many clienteles to avail of the multi-faceted technical assistance CLSU can provide. The establishment of the Plant Pest Diagnostic Laboratory as part of this project will serve as a venue for research where investigation and diagnosis of plant and animal health problems and corresponding control measures can be undertaken.

Animal, plant pests and pathogens remain to be a scourge for farmers. In attempts to help the agricultural sector, this laboratory will be established to meet its goals. It is well recognized that the development of effective crop pest and animal disease management should depend on the rapid detection and precise identification of the causative organism. The laboratory will serve as an information center for researchers, students, agricultural technologists and farmers. It will cater a wide range of services such as:

- a. Sero-diagnostic procedures in plant disease detection
- b. Pathogen and insect identification in various crops
- c. Microscopy and culture of plant pathogens and insects
- d. Quarantine function and provide assistance in monitoring field trials and experiment
- e. Give farmers training on pest management activities

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<sup>1</sup> The RET Complex will house under one single roof the Research Office and Laboratories, the Training Office and the Extension Office.

- f. Routine sampling in areas to check presence of possible disease carriers that require isolation and identification of pathogens, antibiotic sensitivity testing
- g. Give recommendations and precautionary measures against plant, pests and animal disease agents

### **1.2. Post Harvest, Food Processing and Seed Technology Laboratory**

The urgent need to increase food production to meet the requirements of a rapidly growing population is widely recognized. To date, progress toward self sufficiency in food production is rapidly offset by population growth with an annual growth rate of 2% per annum.

There are two general ways of getting into self sufficiency in food. One is to increase food production; the other is to reduce production losses. Research and development efforts aimed at increasing food production have been carried out vigorously during the recent years with a notable degree of success. Breeding programs have created high yielding varieties which provide a high yield potential when provided with suitable production inputs.

The problem of reducing post production losses has until recently given little attention. Fortunately, interest in research, development, education activities related to post production is growing rapidly. Thus, putting up laboratory facilities related to post harvest, processing and seed technology laboratory facilities will aid researches, students and other stakeholders educate the importance on post harvest operations related to major commodity crops.

Furthermore, doing research on the added value of major commodity crops can help uplift the lives of the local farmers it serves. By establishing laboratory facilities in order to cater the increasing needs not only of students, faculty members, researchers but also the private and public sectors.

### **1.3. Soil and Water Laboratory**

The Central Luzon State University, over the years, has developed expertise in the field of agricultural engineering and other related courses. It has undertaken numerous research and development projects/programs in soil and water management. Faculty members and staffs have been sent to different parts of the world to conduct relevant studies, trainings, seminars, workshops and conferences to link their work to the broad field of discipline.

Many problems have been identified, such as water scarcity or drought, soil erosion, floods, high seepage, deep percolation, inefficient irrigation, and many other problems, which are associated as soil and water management problems. Thus, proper soil and water management practices may ensure higher food productivity, adequate supply and good quality water for agricultural purposes.

Availability of the appropriate tools and equipment for soil and water may facilitate proper soil and water management practices for the different clientele: farmers, researchers, trainers, extension workers, teachers, students and other stakeholders.

#### **1.4. Analytical Service and Instrumentation Laboratory**

The need for the upgrading of equipment and facilities of the analytical and service laboratory at CLSU is indeed imperative. The university is continuously serving the scientific, academic and farming communities as well as the industry in the region. However, its analytical service is delimited by insufficient equipment. Oftentimes the clients bring the samples to a research institute or university in Metro Manila which therefore poses additional expense. The inaccessibility of these equipments coupled with insufficient funds also becomes contributory to the loss of interest of the clients. Farmers for instance who really need technical intervention and advice prefer not to bring samples to Metro Manila for analysis. Thus if the desired equipment are readily available at CLSU Science Centrum, this problem can be addressed.

#### **1.5. Training, Conference and Office Facilities**

The RET is the premier arm of CLSU for empowering people and communities to improve their quality of life via credible and sustainable agriculture and development projects. Its goal is to actively support sustainable agro-industrialization and balanced socio-economic growth through technology and information generation and commercialization, integrated capability-building, communication advocacy on market-driven innovations and partnership with different stakeholders of development.

The RET complex is the hub of research and development activities. It will house the administrative, research, extension and training offices, laboratories, and other support facilities, CLARRDEC Secretariat Office, and the One-Stop-Information Shop for agricultural technology and management.

Research and development (R &D) breakthroughs are without impact if it is not shared or disseminated via trainings and other related activities. Aside from the various CLSU trainings conducted in these facilities, CLSU has also a track record of providing facilities to various governments, non-government, private and peoples' organization in almost two decades already. In 2007, it has accommodated/served 87 conventions with 5,225 participants. With years of use, the facilities need to be rehabilitated and improved in order to make it conducive for learning and keep abreast of the growing needs of its clients and organizations needing conference-related services, and to be competitive (as income generating project of the University) with other service providers in the province. Back-up services and equipment such as audio-visual system, computer and internet, telephone system, photocopying services should be available for the convenience of training participants and organizers.

## **COMPONENT 2: Upgrading and Strengthening the University's Research Capability in the Breeder Sciences (UPSURGE Project)**

**Budgetary Requirement:     PHP 7,020,000.00**

### **2.1. Justification:**

The College of Arts and Sciences of the Central Luzon State University being the hub of the breeder sciences (biology, chemistry, mathematics and physics) and their allied disciplines (environmental sciences and statistics) and being the service college of the university has a strong and dynamic human resources that continuously serve its students and the industry through effective teaching and consultancy services. Its biology program has metamorphosed from being a center of development to becoming a center of excellence in 2013. The revision of its BS Biology program was revised and approved by CHED in 2013 which highlighted the major fields of biology namely microbiology, botany, zoology and biotechnology. Its chemistry program remains to be a center of development. Its Department of Environmental Sciences which was established in 2012 offers BS Environmental Science. Starting 1<sup>st</sup> semester 2013, graduate programs were vertically articulated in the undergraduate departments. The Physics section of the Department of Mathematics and Physics was moved to its new building (the former RSTC Building) to provide more emphasis on its role in teaching and research. The college also has a mushroom research and development center which serve as a laboratory for students and other stakeholders of the industry. Thus with these recent developments and the emerging challenges of the global education such as ASEAN integration, the breeder sciences need to be strengthened by upgrading its laboratory facilities and equipment juxtapose with continuing faculty and staff development program.

### **2.2. Project Components:**

#### **2.2.1. Gene Banking of Philippine Wild Edible and Exotic Mushrooms**

The Central Luzon State University has a Center for Tropical Mushroom Research and Development, which is the only center in the country that generates through research practical and innovative technologies which are suitable in the rural areas of the country. Its emphasis is on the domestication of Philippine wild edible mushrooms. To date, more than 10 wild species have been domesticated and exotic cultures have been successfully propagated which resulted in their commercial cultivation by the mushroom growers in the country. Researchers and mushroom growers visit the center to avail of these mycological resources. However, the mycelia of wild and exotic mushrooms are deposited in the center in a conventional manner (i.e. periodic transfer) due to limited facilities. This conventional approach of preserving and storing cultures of mushrooms oftentimes leads to degeneration, lost of vitality and contamination. Therefore, there is a need

to upgrade its storage facility through cryogenic preservation of cultures. Cryogenic preservation maintains the genetic stability and productivity of these mycological resources for a longer period of time.

Objectives:

1. To rescue the mycelia of the wild edible mushrooms in the Philippines
2. To serve as source of cultures for researchers and mushroom growers
3. To ensure the genetic stability of the wild and exotic mushroom species
4. To conserve our Philippine wild edible mushrooms and preserve the exotic species of mushrooms with commercial potential

### 2.2.2.1. Equipment Outlay

<p><b>Scanning Electron Microscope</b></p> <p><b>Electro optical system</b></p> <p><b>Signal reception processing and display system</b></p> <p><b>Vacuum system</b></p> <p><i>Specifications:</i></p> <p><i>Electron gun hair fork tungsten cathode</i></p> <p><i>Resolution 6.0 nm (Tungsten filament)</i></p> <p><i>Magnification 15 x 250,000x</i></p> <p><i>Electron optical system</i></p> <p><i>Electro gun: Tungsten emitter</i></p> <p><i>Accelerating voltage: 030kV</i></p> <p><i>Lens system: Three electron magnetic lens system</i></p> <p><i>Objective lens aperture: three apertures selectable</i></p> <p><i>Specimen chamber:</i></p> <p><i>Six ports for WDS, EDS, BSE detectors and other attachment installation</i></p> <p><i>Specimen Stage:</i></p> <p><i>Standard stage Displacement: X and Y lateral motions 50 mm, Z motion 25 mm, tilt 5<sup>0</sup>, 90<sup>0</sup>360<sup>0</sup>continuous rotation</i></p> <p><i>Computer System:</i></p> <p><i>PC compatible, Microsoft™, Windows™ XP operation system</i></p> <p><i>Image Display:</i></p> <p><i>Digital image, 1024 x 768 frame and display resolution</i></p> <p><i>Scanning mode: Full frame, plane, line, spot, selected area dual magnification and screen split; 17-inch colour viewing monitor</i></p> <p><i>Operate and control software</i></p> <p><i>The brand new design operate software, SEM control by using keyboard and mouse only. Versatile automatic function. Parameters of SEM operation can be stored and easily managed.</i></p> <p><i>Image processing and analyzing</i></p> <p><i>Image enhancement, threshold transformation, particle statistic analysis, morphology transformation, gray level histogram display and pseudo-colour transform for gray scale image.</i></p> <p><i>Image output and record: Versatile image document formats, support digital monochrome printer and versatile print out equipment with standard interface</i></p> <p><i>Vacuum system</i></p> <p><i>Fully automatic high speed diffusion pump vacuum system (turbomolecular pump optional)</i></p>	<p><b>PhP 7,020,000.00</b></p>
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## **2.2.2. Proposal to Establish the Laboratory of Environmental Analytical Chemistry (LEACH)**

### **2.2.2.1. Justification**

Degradation of environmental quality is among the problems that developing countries like the Philippines have to deal with. Urbanization, industrial growth, and various economic activities can result in the release of harmful substance in the environment. Monitoring the quality of the environment is of utmost importance in planning for measures to protect human health and ecosystem integrity from the adverse effects of pollutants.

The Central Luzon State University began offering a BS Environmental Science program in 2011, and has been offering a BS Chemistry program since the 1980s. The students of both programs can benefit from training in chemical analyses of environmental media. A laboratory that specializes in environmental analytical chemistry is needed to provide the students with hands-on experience.

The Department of Chemistry maintains an analytical service laboratory. Its current range of services can be expanded to include the analyses of environmental samples. A laboratory equipped with instruments for environmental chemical analyses will enable the Department to extend its services.

A laboratory dedicated to environmental analytical chemistry will also enable the faculty members of the Department of Environmental Science and the Department of Chemistry to conduct more research activities involving the analyses of environmental pollutants, or environmental remediation strategies.

This proposal seeks to establish the Laboratory of Environmental Analytical Chemistry (LEACH), under the supervision of the College of Arts and Sciences. LEACH is envisioned to be a laboratory that will equip the students with hands-on training in chemical analyses of environmental samples, further encourage the conduct of research on environmental chemistry, environmental monitoring, and environmental remediation, and enable the university to provide analytical services to clients that require chemical analyses of environmental samples.

### **2.2.2.2. Description**

LEACH shall be located at Room 258 at the Chemistry Wing of the CAS Annex, and shall be a shared facility of the Department of Environmental Science and the Department of Chemistry.

To set up LEACH, Room 258, which currently serves as classroom for courses being offered by the Department of Environmental Science and Department of Chemistry, must be renovated into a laboratory room. Basic pieces of laboratory furniture such

as laboratory tables and fume hood must be installed, and the room must be furnished with equipment needed for chemical analyses.

LEACH shall complement the existing facilities of the Department of Chemistry, enabling faculty members and students in CLSU to perform chemical analyses of various environmental samples.

### 2.2.2.3. Impacts

**Highly trained students.** Students of the BS Environmental Science and BS Chemistry programs shall gain hands-on experience on environmental analytical techniques, making them better prepared for jobs that deal with environmental quality assessments.

**Enhanced research capability.** LEACH shall enable the students and faculty members of the Department of Environmental Science and Department of Chemistry to perform chemical analyses relevant to topics on environmental chemistry, environmental quality monitoring, and environmental remediation. This may lead to increased research outputs in the form of journal publications or conference presentations.

**Increase in income.** The Department of Chemistry may expand its services to include the analysis of various environmental samples, thereby earning more income for the university.

### 2.2.2.4. Activities

Activities		Month											
		1	2	3	4	5	6	7	8	9	10	11	12
1.	Procurement of equipment and supplies	■	■	■	■	■	■						
2.	Preparation of research proposals for submission to other funding agencies	■	■	■	■	■	■	■	■	■	■	■	■
3.	Installation of laboratory furniture				■	■							
4.	Installation of instruments and fixture						■	■	■	■			
5.	Method optimization / Establishment of protocols							■	■	■	■	■	■
6.	Promotion of laboratory services							■	■	■	■	■	■
7.	Conduct of research activities							■	■	■	■	■	■

### **2.2.3. Proposal to Establish the Laboratory of Environmental Nanotechnology and Sensors (LENS)**

#### **2.2.3.1. Justification**

Nano-sized materials have attracted a lot of attention from researchers around the globe due to their unique and size-dependent properties. They have been applied in various products and processes, and the exploration of the many ways by which nanomaterials can be exploited to benefit mankind continues. Among the possible application of nano-sized materials is in solving environmental problems, such as in remediation of contaminated environmental media. They may also be applied in developing new and more sensitive strategies and sensors to detect and quantify environmental pollutants.

Here in CLSU, researchers from the Department of Environmental Science and Department of Chemistry have recently synthesized nanoparticles and applied them to degrade a dye which served as a model environmental contaminant through visible light photocatalysis (manuscript in preparation). This initial effort proves that CLSU has the capability to the conduct research on nanotechnology, and that this research competence may be greatly enhanced when more instruments and materials are made available in the campus.

This proposal seeks for the creation of the Laboratory for Environmental Nanotechnology and Sensors (LENS), a hub for researchers from the Department of Environmental Science, Department of Chemistry, and Department of Mathematical Sciences and Physics with interest in the synthesis, characterization, and application of nanomaterials, and in developing sensors. LENS is expected to increase the university's research output in nanotechnology and sensors by providing the workspace and basic instruments and materials to start a nano- or sensors-themed investigation.

#### **2.2.3.2. Description**

LENS shall be set up at the Department of Chemistry Laboratories at the CAS Annex. The existing laboratory room shall be upgraded with laboratory instruments typically used in a nanomaterials and sensors research. LENS shall be a research facility shared by the Departments of Environmental Science, Chemistry, and Mathematical Science and Physics. It shall complement the existing facilities of the Department of Chemistry, and researchers affiliated with LENS may also avail of the instruments and materials already existing at the Department of Chemistry Laboratories.

#### **2.2.3.3. Impacts**

**Enhanced research output.** LENS may raise the interest of faculty members of the Departments of Environmental Science, Chemistry, and Mathematical Science

and Physics on nanotechnology and sensors, and lead to increase in publications and conference presentations of papers on these topics.

**Upgrading of research capability.** LENS shall provide researchers in the university with the tools to conduct study on nanotechnology and sensors.

**Added value to the university.** Through the research conducted at LENS, CLSU shall also be known to be involved in advanced science and technology aside from its already renowned expertise in the agricultural sciences.

### 2.2.3.3. Activities

Activities		Month											
		1	2	3	4	5	6	7	8	9	10	11	12
1.	Procurement of equipment and supplies												
2.	Preparation of research proposals for submission to other funding agencies												
3.	Conduct of orientation training/seminar for potential researchers												
3.	Installation of laboratory furniture												
4.	Installation of instruments and fixture												
6.	Conduct of research activities												

## COMPONENT 3: Enhancement of Engineering Laboratories in Preparation for the Implementation of the Outcomes-Based Education (OBE) System (Engineering OBE Project)

**3.1. Funding Requirement: P12,000,000.00**

**3.2. Rationale:**

In July 2012, the CHED had issued CMO No. 37 series of 2012 requiring all Higher Education Institutions (HEIs) offering engineering degree programs to shift to Outcomes-Based Education (OBE) System. This was based on the rationale that "Quality education is now measured not only by effectiveness, efficiency and sustainability, but also by relevance". Relevance in education would mean

addressing the needs of the students and the employers of today and making the future graduates globally competitive.

In line with this, there is then a need for the College of Engineering to enhance its laboratory facilities by way of acquiring the necessary equipment as required by CMO No. 37 and, at the same time, construct new buildings to house this equipment.

### **3.3. The Project**

#### **3.3.1. Description**

The project consists of constructing a laboratory building and a field laboratory, and the acquisition of equipment to be used in different laboratory subjects and activities.

#### **3.3.2. Laboratory Building and Field Laboratory**

One (1) laboratory building and one (1) field laboratory are hereby proposed to be constructed. The laboratory building shall be named "Outcomes-Based and Competency-Based Laboratory Building". It shall house four (4) laboratory modules, namely; the Crop Processing, Refrigeration Engineering, Farm Power and Machinery and Renewable Energy Laboratory Modules. There are no permanent dividing walls between and among each module as shown in the building design and plans, making the space more flexible whenever a certain laboratory module needs a bigger space for a given activity. However, ten portable cubicles shall be provided inside the building. The OBE-CBE system suggests that any student or faculty who would like learn and work individually during their vacant times are free to use all the facilities and equipment in the OBE-CBE building. The estimated total cost of this building is P6,524,519 as shown in the Program of Works. The plans for the OBE-CBE building are hereby attached.

The Field Laboratory shall be the venue for the field laboratories in irrigation, drainage and soil and water conservation engineering. It will also serve as the research area for graduate and undergraduate students, as well as for faculty members. Its area is 5,000 square meters which shall be enclosed with perimeter fence made of hollow blocks, interlink and GI pipes. The Plans and Program of Works for this are hereby attached. The total cost of the field laboratory (excluding Items 1 and 2) is P494,780.94.

Inside the 5,000 square meter area are the following:

1. Land and Water Laboratory – laboratory for students and faculty members who will be conducting their laboratory activities, as well as their researches. Attached are the Plans and Program of Works of the laboratory. The total cost of the shed is P694,123.87.

2. Four (4) greenhouses – for conducting researches in crop production using different irrigation methods, automation for modifying the crop's environment, climate change simulation, hydroponics and aeroponics. They shall also be used for producing different crops whenever no researches are conducted. Each greenhouse shall measure six meters wide and 12 meters long (72 square meter area), but is modular, meaning it could be expanded longitudinally if there is a need to. Inside the greenhouse are irrigation facilities (sprinkler and drip systems, pumps, and tanks), air conditioning systems, and exhaust fans, circulating fans and sensors and data loggers for soil moisture content, temperature and relative humidity monitoring. Attached are the Plans and Program of Works for the four greenhouses. The total cost of the greenhouses is P994,924.90.

The estimated total cost of the Field Laboratory including the Land and Water Laboratory and Greenhouses is P2,183,829.71.

The infrastructure component is hereunder summarized:

<b>Building:</b>			
OBE-CBE Building		6,524,519.00	
		<b>Total (Building)</b>	<b>6,524,519.00</b>
<b>Other Structures:</b>			
Field Laboratory		494,780.94	
Land and Water Laboratory		694,123.87	
Four Greenhouses		994,924.90	
		<b>Total (Other Structures)</b>	<b>2,183,830.00</b>

### **3.4. Objectives**

#### **3.4.1. General Objective**

To enhance the Engineering Laboratories in preparation for the implementation of the Outcomes Based Education (OBE) system.

#### **3.4.2. Specific Objectives:**

- a. To upgrade the laboratory facilities of the College of Engineering for teaching, research and development purposes.
- b. To achieve the sustainability of the College of Engineering laboratories of its program components.
- c. To improve the performance and capability of the graduates of the different programs of the College of Engineering.

### 3.5. Location

The OBE-CBE building shall be located in the College of Engineering compound while the Land and Water field laboratory shall be located in the College of Engineering farm. The locations maps for the OBE-CBE building and the field laboratory are hereby attached for reference purposes.

### 3.6. Project Activity and Timeline

Activity	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Bidding												
Construction												
Equipment Acquisition												

### 3.7. Beneficiaries

Students, faculty members, researchers

### 3.8. Equipment Outlay

Table 1 presents the list of equipment to be purchased. The total equipment cost is P3,291,651.29. The total project cost (building + field laboratory + equipment) is P12,000,000.00.

Table 1. List of equipment to be purchased.

Quantity	Unit	Description	Unit Price	Total Price
1	Set	Base frame with power supply, virtual instrument and USB PC Interface	P 587,190.49	P 587,190.49
1	Set	Electrical Power Digital Measuring Unit	446,290.98	445,290.98
1	Set	Solar Energy Modular Trainer	894,169.82	894,169.82
1	Set	Wood Thickness Planer	50,000.00	50,000.00
1	Set	Wood planer/jointer	80,000.00	80,000.00
1	Unit	Circular Saw (Table Model)	80,000.00	80,000.00
1	Set	General cycle refrigeration trainer	250,000.00	250,000.00
1	Set	Air conditioning laboratory unit	250,000.00	250,000.00
1	Unit	Testing husker	90,000.00	90,000.00
1	Unit	Testing mill	90,000.00	90,000.00
1	Unit	Testing dryer	90,000.00	90,000.00
1	Unit	Testing winnower	90,000.00	90,000.00

1	Unit	Testing thickness grader	90,000.00	90,000.00
1	Unit	Testing rice grader	90,000.00	90,000.00
1	Unit	Grain counter	35,000.00	35,000.00
1	Pc	Handy moisture meter for grains	30,000.00	30,000.00
1	Unit	Oven drier	50,000.00	50,000.00
<b>TOTAL</b>				<b>P3,291,651.29</b>

**COMPONENT 4 : Veterinary Learning Center for Epidemiology and Animal Disease  
Diagnostics (VET – LEAD Project)**

**Budgetary Requirement: Php 12,500,000.00**

**4.1. Justification**

Two critical competencies of a veterinary degree graduate are epidemiology and animal disease diagnosis. This has been emphasized by the World Organization for Animal Health (OIE). Such are of high interest considering the impact of these disciplines in the animal industry and national economy. The inability to recognize and respond effectively to animal disease threats will result to grave losses due to animal deaths or compromised animal trades. Thus, it is imperative that these competencies should be inculcated in every DVM graduate.

With the existing linkages of the College of Veterinary Science and Medicine to the Department of Agriculture - Bureau of Animal Industry (DA-BAI), and Food and Agriculture Organization (FAO), the establishment of the Learning Center for Epidemiology and Animal Disease Diagnostics (LEAD) is a significant boost to the capacity of the college to continuously provide services to these agencies.

The College of Veterinary Science and Medicine has been awarded by the Commission on Higher Education (CHED) as a Center of Excellence in veterinary education since 2009. Coupled with this distinction is the responsibility to assist other veterinary schools of the country. The college is also known for its strength in Veterinary Epidemiology with at least three Epidemiology experts. It also offers a Master of Veterinary Studies program with strong emphasis in Epidemiology. Epidemiological trainings such as the National Applied Veterinary Epidemiology Training (AVET) are often tasked to the members of the faculty by the Food and Agriculture Organization (FAO) since 2006. There was a time that the CLSU-CVSM was tapped by the FAO as the sole Training Provider for AVET in its National Trainings for Field Veterinarians in the country.

Thus, the establishment of the Learning Center for Epidemiology and Animal Disease Diagnostics (LEAD), and the capability of the members of the faculty of the College of Veterinary Science and Medicine to provide epidemiologic competency among veterinary professionals and students will help address the expectation of the World Organization for Animal Health (OIE) from a veterinary graduate.

**4.2. Project Description**



The project shall be engaged in building capacities in epidemiology, animal disease diagnosis, surveillance and control, including disease outbreak, and emergency response. The project will enhance the capability of the college of Veterinary Science and Medicine to provide (1) assistance to the veterinarians from local government units or private sectors in responding to disease threats, and (2) increase the capacity of veterinarians to protect the health and welfare of animals in their areas.

The project will serve as a hub for relevant and updated animal data needed to safeguard the livestock industry in the area from disease threats specially those of high economic importance such as Fasciolosis, Surra, Porcine Epidemic Diarrhea and Foot and Mouth Disease, among others. It will also serve as a training centre to increase the capacity of veterinary professionals from many provincial and city veterinary offices to respond to disease threats. The competency to evaluate herd health and productivity will also be shared to training participants.

This project is of great benefit among its direct and indirect beneficiaries. Likewise, as these beneficiaries gain competencies, the livestock industry is being improved. The Commission on Higher Education (CHED) is advocating the “outcome-based education” (OBE) modality. Through the project, the college will be more able to provide the necessary equipment and facilities to provide “hands on” activities to the students. Likewise, as the project will also cater to faculty members of other veterinary schools throughout the Philippines, the acquired competencies may be reverberated to their students. Thus, it is expected that this project will provide a significant share to the development of the livestock industry not only in Central Luzon but also in other areas of the country.

### **4.3. Beneficiaries**

#### **4.3.1 Primary (Direct) Beneficiaries**

Students

Higher Education Institutions (HEIs) in the Philippines

Veterinarians from local government units

Veterinarians from private companies

#### **4.3.2 Secondary (Indirect) Beneficiaries**

Farmers, Livestock Raisers

### **4.4. Location**

The project shall be located at the College of Veterinary Science and Medicine (CVSM), Central Luzon State University.

Seventy percent of the faculty members of CVSM have completed their post-graduate degrees. Three have PhD/DrPH degrees and 12 are MS/MVSt/MVSc degree holders. The outstanding performance of the CVSM faculty members caught the

attention of national organizations. With their numerous accomplishments and contributions to the veterinary education, one faculty member was recognized by the Professional Regulation Commission (PRC) as 2013 Outstanding Professional in Veterinary Medicine; five faculty members were hailed Outstanding Veterinarian in Education in five record years (2014, 2012, 2011, 2007 and 1998) by the Philippine Veterinary Medical Association. Another one was recognized as the Most Outstanding Veterinarian in Veterinary Research in 2010 by the Veterinary Practitioners Association of the Philippines. For three successive years, the Veterinary Practitioners Association of the Philippines gave its Outstanding Veterinarian in the Academe Award to CLSU veterinarians as well. In 2007, another faculty member was awarded the Outstanding Teacher in Animal Science from the Philippine Society of Animal Science.

The College maintains research collaborations with various national and international institutions. The CLSU CVSM signed Memoranda of Understanding with international institutions to establish academic cooperation and research collaborations. These include Hokkaido University Research Center for Zoonosis Control, the Iowa State University, the Australian Centre for International Agricultural Research and the Food and Agriculture Organization of the United Nations. The national institutions on the other hand include the Commission on Higher Education, the Bureau of Animal Industry, and the Philippine Council for Agriculture, Aquatic, and Natural Resources Research and Development, the Department of Science and Technology, the Philippine Rice Research Institute, the Philippine Carabao Center and the Small Ruminant Center.

Several researches have been completed and received national and international recognitions and won numerous awards. Research papers written by faculty members and students of the College have been published in several local, national and international journals. Since 2004, the College has been publishing its own research journal. Annually, the faculty members of the College present their best research outputs in various national and international scientific meetings.

#### 4.5. Infrastructure and Equipment Outlay

Items	Amount (Php)
<b>A. Building Construction</b>	<b>5,000,000.00</b>
<b>B. Diagnostic Laboratory Equipment</b>	
1. Haematology Analyzer	600,000.00
2. Clinical Chemistry Analyzer	400,000.00
3. Portable Ultrasound	300,000.00
4. Binocular microscope with 5 objectives and interchangeable condenser system for bright field, phase contract and dark field techniques	100,000.00
5. Non-refrigerated Horizontal Centrifuge	180,000.00



**Component 5 : Agricultural Education Enhancement Through Science And Technology For Readiness to Global Economic Integration (AGRI – EDU S&T Project)**

**Budgetary Requirement : Php 13,000,000.00**

**5.1. Justification**

A growing demand for labor continuously increases annually both domestic and in the world market. The forthcoming integration of ASEAN in 2015 allows free movement of goods as well as services. This requires us that as an academic unit offering courses in Agriculture, Agribusiness and Entrepreneurship must be able to produce graduates that are highly competitive compared to our Asian neighbors to meet the qualifications framework set by every member of the ASEAN region. In addition to this, the shift to Outcomes-Based-Education (OBE) and the implementation of the international mobility for students necessitates us to further enhance our curricular offerings coupled with the provision of the necessary laboratories, research facilities and projects for scientific investigations, acquisition of knowledge and competencies as well as honing their entrepreneurial skills. To perform its vital role in producing top quality agriculture graduates, upgrading the laboratory facilities and acquisition of high-end equipment for discovery of new knowledge is inevitable. If we have to fast track and will be at par with our ASEAN neighbors, we don't have to sit down and lost time, let's act now for tomorrow will be late already.

**5.2. Project Description**

**5.2.1. Upgrading of Laboratory Facilities for Outcomes-Based Education (OBE) and Cutting-Edge Research**

This component is intended to enhance the teaching competencies as well as the research capabilities of faculty members and in turn students will acquire the necessary competencies required in their programs to narrow the gap of "mismatched" graduates needed in the labor market and alleviate problems of poverty and food security specifically in the rural farming communities of the country.

Specifically, it will improve the following through the acquisition of equipment and other facilities as demanded by the various curricular programs:

**a) AGRI-BIOTECH Laboratory**

- |                         |           |
|-------------------------|-----------|
| 1. Laminar flowhood     | - 150,000 |
| 2. Fumehood             | - 280,000 |
| 3. BIO-RADGEL Doc       | - 150,000 |
| 4. Hot Water Bath       | - 104,000 |
| 5. Table Top Centrifuge | - 50,000  |

6. pH Meter	- 140,000
7. Bio-Freezer (-70°C)	- 850,000
8. Refrigerator	- 20,000
9. Liquid-N Tanks	- 30,000
10. Analytical Balance	- 96,000
11. Distilling Apparatus	- 130,000

**TOTAL: PhP 2,000,000**

**b) Central Laboratory** (Crop Science/Soil Science/ Crop Protection and Animal Science)

1. 1 High End Stereoscope	- 250,000
2. 5 Dissecting Stereoscope	- 125,000
3. 5 Binocular compound	- 200,000
4. 1 Kjeldahl Digestion & Distillation Set-Up	- 700,000
5. 3 Fume Hood (250 K)	- 750,000
6. 1 Distilling App	- 500,000
7. 5 Desiccators (80 K)	- 400,000
8. 1 Mettler Balance (.000)	- 180,000
9. 1 Analytical (.0000)	- 220,000
10. 1 Lab. Refrigerator	- 65,000
11. 3 pH Meter (120 K)	- 360,000
12. 3 Oven (150 K)	- 450,000
13. 2 GPS (35 K)	- 70,000
14. 2 GPS (25 K)	- 50,000
15. 1 ELBA oven	- 85,000
16. 1 Pouch Sealer Machine	- 200,000
17. 1 Canning Machine	- 200,000
18. 2 Vacuum Sealer	- 500,000
19. Pressure Plate w/ suction pump (15 bar, 21 bar, 1/3 bar)	- 300,000
20. Spectrophotometer	- 350,000
21. 3 Leaf Area Meter (60 K)	- 180,000
22. Chlorophyll content meter	- 15,000
23. Moisture content meter	- 11,000
24. 2 Grinder Wiley mill (180 K)	- 360,000
25. Commercial Food Processor for bio-pesticide	- 15,000
26. Commercial Bagger w/ Sewer	- 250,000
27. Vegetable Crisper	- 140,000
28. Smoking Machine	- 150,000
29. Greenhouse Set-Up	- 250,000
30. Growth Chamber	- 420,000
31. Heavy Duty Weighing Scale (100kg cap.)	- 30,000
32. 1 Vacuum Emasculator	- 14,000
33. 5 Water Bath (15 K)	- 100,000
34. Rotary Vap	- 50,000
35. Shaker	- 60,000

**TOTAL: PhP 8,000,000**

### **5.2.2. Entrepreneurship and Enterprise Development for Rural Improvement**

This component will involve the expansion of the Entrepreneurship Laboratory by construction of an additional building for immersion of students especially in products development, marketing/sales and transfer of technology for the establishment of entrepreneurial projects. Also, the laboratory will showcase the various economic activities of Entrep students of the University which could result to increased sales of agri-based products and services. Moreover, it will embed among graduates the **“learning-to-learn”** mindset and advocates the development of more young “entrePinoy” in the countryside who will promote the viability and growth of micro-, small and medium enterprises that would sustain economic growth. The estimated total cost of the Entrep Laboratory Showroom is P3,000,000.

Specifically, it will do the following:

- a) Expansion/Construction of the “Agri-EntrePinoy” Laboratory
  - Showcasing/Setting up of economic model entrep projects/activities
  - Technology transfer for rural entrepreneurship
- b) Nurturing Innovative students and creative thinkers (a form of consultancy or advice/guidance)

## **5. 3. Objectives**

### **5.3.1 Immediate Objectives**

#### **5.3.1.1 Upgrading of Laboratory Facilities for Outcomes-Based Education (OBE) and Cutting-Edge Research**

- a. To upgrade the instruction and research facilities of the college to become OBE-ready.
- b. To broaden the instruction and research and development capabilities of the stakeholders of the college.
- c. To increase the number of pool of experts that can address research and training needs of the various sectors of the society especially the agriculture sector.
- d. To achieve and sustain the different services provided by the different departments of the college.

#### **5. 3.1.2 Entrepreneurship and Enterprise Development for Rural Improvement**

- a. To provide the entrep students an avenue to practice their creativity, innovativeness and their ability in decision-making.
- b. To help the students recognize how skills, hobbies, interests and experiences relate to the work and lifestyle they will choose in the future.

- c. To expose the entrep students to the roles of an entrepreneurs and help them develop their own formula of success.

#### **5. 4. Beneficiaries**

Student; Farmers; Out-of-school youths  
Educational institutions; R&D agencies and organizations  
Entrepreneurs; and people's organizations (PO)