CEAT CENTENNIAL CELEBRATION

"Partner in Molding Excellent Engineers and Developing Appropriate Technologies for the next Century"

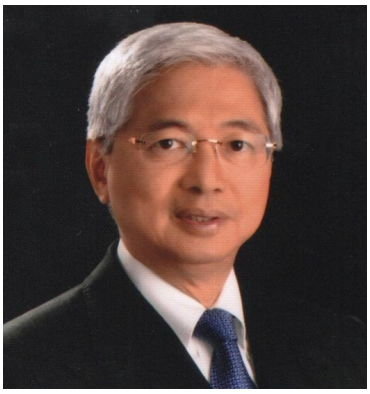
FOREWORD

The Centennial Celebration is the recognition of CEAT's 100 years of accomplishments, tradition and pride in history. With the theme ***"Partner in molding excellent engineers and developing appropriate technologies for the next century",*** we at CEAT reaffirm our commitment to provide engineering leadership in the country, being internationally recognized for offering distinctive learning experience at the frontiers of engineering R&D. In our endeavors, we are very fortunate to work with other Colleges in the University and collaborators towards solving agro-industry problems.

This souvenir program is a compilation of our history, reminiscences, CEAT unit profiles, technologies developed through the years, our activities with the support of the CEAT Alumni Association during our centennial celebration, and CEAT students' organization profiles.

We would like to thank the CEAT Centennial Celebration Committee and all the writers for their invaluable efforts towards the production of this souvenir program. We also thank all the sponsors for their continued support.

ARNOLD R. ELEPAÑO
Dean, CEAT



Hon. Alfredo E. Pascual

UP SYSTEM PRESIDENT

Congratulations to the University of the Philippines Los Baños (UPLB) College of Engineering and Agro-Industrial Technology (CEAT) for 100 years of service to the people. May this centennial celebration mark the beginning of another century of service to secure an even brighter future for the UPLB CEAT.

The theme "Partner in molding excellent engineers and developing appropriate technologies for the next century" reflects UPLB CEAT's vital role in producing human resources, capabilities and material that are needed to for the cuntry's progress and, at the same time, in making UP a great university in the 21st century.

Since its establishment as UPLB CEAT in 1983, the college has taken a leadership role in producing excellent engineers, technologies, and knowledge products beneficial to the people. Together with partners from the academe, government, industries, civil society, and international organizations, the college responds to the country's needs and lays the grounds for a sustainable future by creating and promoting appropriate engineering technologies.

The UPLB CEAT alumni, faculty and staff as well as its present generation of *mga iskolar ng bayan*, have so much to offer this nation. I am confident that the UPLB CEAT, as party of the UP System dedicated to shaping minds that shape the nation, will continue to shine brighter in the next 100 years as one of the leading institutions that promote and uphold real economic and human development.

"Padayon UP! Onward UP!"

ALFREDO E. PASCUAL
President

Dr. Rex Victor O. Cruz

CHANCELLOR

University of the Philippines, Los Baños

Warm greetings to the UPLB College of Engineering and Agro-Industrial Technology (CEAT) on the occasion of your Centennial Anniversary!

One hundred years give us more than enough reason to celebrate. From its humble beginnings as a Department of Agricultural Engineering, its reorganization into the Institute of Engineering and Technology until its elevation into a college in 1983, CEAT has not only established itself as a forerunner in the field of agricultural engineering but its graduates in other fields such as Chemical, Electrical, Civil and Industrial Engineering have consistently produced the country's brightest and most influential engineers and industry leaders.

As we celebrate your centennial foundation, let us not forget that the very reason why you stand proud and tall is because you are standing on the shoulders of the great men and women whose strings of accomplishments made a huge impact on the lives of many Filipinos especially the small farmers.

It is my fervent hope that CEAT's 100 year legacy will continue to mold, shape and educate the best engineers of our country and our next generation of dynamic leaders who will be the University's staunch partners in nation building.

Congratulations and cheers to the next 100 years!

REX VICTOR O. CRUZ
Chancellor

Simeon A. Cuyson
PRESIDENT
UPLB Alumni Association, Inc.

Congratulations to the faculty, staff, students, alumni and friends of the College of Engineering and Agro-Industrial Technology (CEAT) in your grand celebration of CEAT's centennial year !

Your theme, "Partner in molding excellent engineers and developing appropriate technologies for the next century" aptly defines the significant role of CEAT, in engineering education, technology generation and extension, for nation building.

UPLBAA fully supports your endeavors, especially your programs and activities which aim to strengthen alumni relations. We pray that CEAT continues its active linkages with its alumni. Surely, the degree with which you collaborate with the alumni will determine your success even as you face new and formidable challenges in the next 100 years.

"Mabuhay ang CEAT !!!"

Simeon A. Cuyson
President, UPLB AA Inc.

Dr. Jovita D. Layoso-Movillon

PRESIDENT

CEAT Alumni Association, Inc.

On behalf of the UPLB-CEAT Alumni Assoc., Inc., let me greet all the CEAT constituents in the grand celebration of the CEAT centennial year. Our theme, "*Partner in molding excellent engineers and developing appropriate technologies for the next century"* affirms CEAT's continuing commitment to the pursuit of excellence in engineering education, research and development- all of these…for nation building.

CEAT is the embodiment of the collective ideals and dreams of all its past, present and future constituents: its students, faculty, staff, alumni and friends. CEAT's achievements in the past century were borne out of the passionate labor and sacrifices of both the known and the not-so-known personalities in the college- from its luminaries, famous professors and successful alumni, to the hardworking staff, technicians, drivers, and utility men; of those who toiled even in the night, and did not count the cost.

The challenges in the next century seem different from what others have met in the past. Our country may still be languishing in the same quagmire of problems even after 100 years, while other nations are doing well in their new global, fast-rate, very mobile and highly protected knowledge economy. We have to contend with the ill effects of climate change; fight terrorism; find cure to new diseases, and emerging breeds of potent and pathogenic viruses and bacteria. In the face of all these threats, CEAT will not be daunted; there will always be men and women who will rise to the challenge and heed the call of excellence, perseverance and hard work. By God's grace, all of us have been part of a wonderful metamorphosis: from a 1912 engineering department to a full-fledged college in 2012; and, together we can do more in "the future and beyond!" This is my prayer for all of us:

" That He would grant you, according to the riches of His glory, to be strengthened with might by His Spirit in the inner man; that Christ may dwell in your hearts by faith; That ye being rooted and grounded in love, may be able to comprehend with all saints what is the breadth, and length, and depth, and height; and to know the love of Christ, which passeth knowledge, that ye might be filled with the fullness of God. Now unto Him that is able to do exceeding abundantly above all that we ask or think, according to the power that worketh in us, Unto Him be glory in the church by Christ Jesus throughout all ages, world without end. Amen. (Ephesians 3: 16-21)"

Dr. Jovita D. Layoso-Movillon
President, UPLB CEAT Alumni Association Inc.

Hon. Anthony "Ton" Genuino
MAYOR
Municipality of Los Baños

Allow me to convey my warmest greetings to the College of Engineering and Agro-Indsutrial Technology on the celebration of your Centennial Anniversary.

Los Baños as the Special Science and Nature City of the Philippines is home to several scientific and research institutions in our country including the premier university where the CEAT stands out through the years.

Your centennial anniversary is an opportune time to develop initiatives beneficial to UPLB, to our academic town, and to the greatest number of our people. I salute CEAT for its continued efforts to raise academic and professional standards, for its accomplishments, hard work, dedication and service to the community worth emulating by the youth in this era of information superhighway and globalization.

To the CEAT students and alumni, may you draw inspiration from your college's sterling accomplishments and from the numerous outstanding alumni it has produced and contributed in nation-building.

Again, congratulations and MABUHAY!

ANTHONY 'TON' GENUINO
Mayor

Dr. Arnold R. Elepaño
DEAN
College of Engineering and Agro-Industrial Technology

My warmest greetings to the CEAT consitutents, alumni and friends.

I would like to extend my deepest appreciation to everyone who in one way or another made our year - round Centennial Celebration a success. With the theme: "*Partner in molding excellent engineers and developing appropriate technologies for the next century*", the College is expected to be in the forefront of addressing new challenges in the field of engineering for the coming years.

In line with UP's move towards a WORLD CLASS university in the 21st century, CEAT will continue to strengthen its capabilities in achieveing excellence in instruction, research and extension. We will continue to grow as what we did in the last century from barely 10 engineering students to around 2,400 students, from a department to a full-pledge College with five degree granting units. We will continue to live on our foundation as "one CEAT" and continue to uphold to the expectations as one of the best engineering schools in the country. We will expand our horizon by offering additional engineering baccalaurete and graduate programs and by undertaking innovative researches and technology transfer schemes that are atoned to the demands of the changing times.

I am very proud and greatful to our faculty, staff, students and alumni, then and now, who have all contributed to what CEAT is today. We are also thankful to the past and current administrations for their unwavering support in achieving our goals.

As we mark the beginning of the next century, we trust that the CEAT family with the support of the Administration and CEAT alumni & friends, will continue to bring pride to our university and the country.

Cheers to another hundred years!

ARNOLD R. ELEPAÑO
Dean, CEAT

CEAT Centennial Celebration Activities 2011-2012

ACTIVITIES	DATE	VENUE
Logo Making Contest	August - September 2011	CEAT
Centennial Kick-Off o Chinese Lantern Flying o Tree Planting o Launching of the CEAT Centennial Memorabilia	October 10, 2011	In front of DL Umali Hall EE Grounds, CEAT EE Bldg., CEAT
CEAT Planning Workshop for the CEAT Roadmap	October 2011	Monte Vista, Calamba City
CEAT Centennial Lecture Series	October 2011 to October 2012	CEAT
2012 CEAT New Year Celebration	January 9, 2012	CEAT-EE Building
Centennial Foundation Day o Awarding of honor students, Outstanding CEAT Personnel, & PRC Board Exam Topnotchers and Retirees	March 2, 2012	CEAT-EE Building
CEAT Centennial Concert	March 2, 2012	DL Umali Hall, UPLB
CEAT Team Building Activity	April 2012	The Park, Real, Quezon
2012 Testimonial for CEAT Graduates	April 2012	CEAT-EE Auditorium
Convocation for 2012 CEAT Incoming Freshmen	June 2012	CEAT-EE Auditorium
Culminating Program for the Centennial Celebration 2012	October 9-10, 2012	CEAT
CEAT ONE – Centennial Fun Run	October 9, 2012	5:00 – 10:00 a.m. Baker Hall, UPLB
Cutting of the ribbon and viewing Technologies Exhibits/Display Photo Exhibits: Memory Lane	October 9, 2012	10:00 – 11:00 a.m. EE Building, CEAT
UPLB 94th Loyalty Day Foot Parade	October 10, 2012	6:00 – 10:00 a.m. CE Car Park
Culminating Program o Unveiling of the commemorative marker o Launching: CEAT Centennial Souvenir Program o Awarding of Best Engineering Design for low cost housing (25 m^2) o Centennial "Salo-salo"	October 10, 2012	10:00 a.m. EE Building, CEAT

CEAT ADMINISTRATION

Dr. Arnold R. Elepaño - Dean

Dr. Richelle G. Zafra - Associate Dean

Dr. Rossana Marie C. Amongo - IAE Director & AMDP Coordinator

Dr. Manolito E, Bambase, Jr. – Chair, Chemical Engineering Department

Dr. Marish M. Madlangbayan- Chair, Civil Engineering Department

Asst. Prof. Roderick L. Catriz – Chair, Electrical Engineering Department

Asst. Prof. Haerold Dean Z. Layaoen- Chair, Industrial Engineering Department

Asst. Prof. Erwin C. Escobar- Chair, Engineering Science Department

Asst. Prof. Ma. Cristine Concepcion D. Ignacio – College Secretary

Dr. Delfin C. Suministrado – Director, AMTEC

Prof. Rex B. Demafelis – Coordinator, Research and Extension Committee

Mr. Paul Michael C. Atienza - CSC Chair, CEAT

Dr. Ernesto P. Lozada - Adviser

AGRICULTURAL ENGINEERING IN U.P. LOS BANOS
1955 – 1977

Dante B. de Padua, PhD
Former Professor of Agricultural Engineering, and Dean,
Institute of Agricultural Engineering and Technology, U.P. Los Baños

This is an informal article of my 'experiences and thoughts" of the college's early years, as requested by **Dean Arnold Elepaño** of CEAT through the Centennial Committee for the Souvenir Program of the CEAT Centennial Celebration 2012. Preparing this has been a pleasure; UP Los Baños has provided the writer with a rich and interesting experience.

It is recorded somewhere that Farm Engineering was taught in the UP agricultural school established in Los Baños as early as 1912 by an American, which marks the beginning of agricultural engineering in UP Los Baños. My first contact with UP Los Baños was in 1950 when the UPROTC cadet corps of UP Diliman was brought to Los Baños in what was then called an annual cadet spree. The author was surprised to see and to be told that the beautiful campus with the quaint Gabaldon style buildings was part of UP. Little did he know that this is where he would settle and raise his family.Years later, the author was invited to join the Department of Agricultural Engineering of the UP College of Agriculture as a Civil Engineering 1955, to work with **Paul Hoff**, a Visiting Professor in agricultural engineering, under the UPCA-Cornell University program. The assignment was to assist Professor Hoff in an experiment to obtain data for the design of an underground drainage system for a waterlogged area in the Central Experiment Station of the UPCA and later on in the implementation of the design. This initial appointment to the UP College of Agriculture in Los Baños, Agricultural Engineering Department was a non-academic appointment, to work as an engineering assistant in the experiment station. This is where the author kicked off in his career as a life-long student of agricultural engineering.

<u>The First Engagement</u>

The area of the experiment station just before getting to the railroad traversing the experiment station was water-logged, and during the rainy season, crops planted in this area were stunted. Professor Hoff of Cornell University was requested to provide a drainage system for the area to lower the water table rapidly. For this exercise, he invited a young civil engineer from UP Diliman. This invitation was very much compatible with the two-year experience of this young man in mechanized highway construction in Mindanao immediately after graduation and after obtaining a license to practice the civil engineering profession. The Los Baños environment attracted this farm boy and thus started the romance of a lifetime with UP Los Baños.

The work plan for the waterlogged area of the experiment station farm was to construct an elaborate underground pipe drainage system. The first step was to prepare a topographic map of the area, needed in determining the proper spacing and layout of drainage pipes, a function of the soil porosity and topography. The final design consisted of 4-inch diameter by 12-inch long concrete pipes laid out in a herringbone fashion to draw water from the surrounding areas. The water seeped into the pipes at the joints and fed it to an 8-inch main line that discharged it into a nearby creek. This underground drainage pipe system appeared to be a common technique in waterlogged farms in the US.

For manufacturing the pipes, a manually operated pipe-making machine which should still be with agricultural engineering was brought in from the U.S. Cement, sand and fine gravel mix, and using a very low water cement ratio, just enough water to hydrate the cement was used so the pipes could be formed with a cylindrical metal form, and a screw auger that drilled the core and compacted the resulting pipe walls. The dry mix allowed the metal form to be opened almost immediately, and the concrete pipe allowed to cure. To accelerate the curing of the concrete pipes, the engineer author experimented with adding calcium chloride, a civil engineering technique to accelerate curing and attain the desired strength within 7 days. With this simple machine hundreds of drain tiles could be produced every week. Note: This same principle and machine was used to put a subgrade drainage system of the College Country Club tennis courts.

Another interesting facet of this assignment was in the digging of the trenches for the pipes. Manual digging with picks and shovels was initially done, but the engineer in charge decided to use his experience with highway construction machinery. A trencher was rented to mechanize the digging operations. A jeepney driver with the mechanical aptitude was trained to operate the machine, which visibly impressed **Professor Hoff**. Laying out the tiles at the correct spacing and grade however had to be done manually with the aid of an engineer's transit.

Finally, the physical performance of the drainage system in lowering the water table had to be measured with an ingenuous method of perforated pipes driven into the ground to observe the water table drawdown. But the real proof of the pudding was with corn crop planted during the rainy season. This part was where the young

civil engineer was introduced to agriculture, to mechanized land preparation, grain drill planting, corn combine harvesting, and silage making. The underground drainage system worked very well, and to this day the area is planted all year round attesting to the effectiveness of the drainage system. Today however, the latter day saints of the experiment station are completely unaware that an underground drainage system is installed in this area. This is fatal for the system in that the discharge end pipe should be kept clean and unobstructed to prevent silting in the drainage pipes.

On the left side of the Pili road heading towards IRRI, **Professor Hoff** opted for an open drainage canals spaced some 25 feet apart and draining into a main canal. For this we used the trencher and a clam-shell digger with the guidance again of the engineer's transit. This design option had something to do with the topography and soil density in the area. This too worked effectively, although the author noted lately that the open drainage ditches are now silted and need maintenance.

The Old Agricultural Engineering Department

In 1955, the Agricultural Engineering Department in Los Baños was one of the several departments of the College of Agriculture. The engineering department was structured primarily to service the Bachelor of Science degree programs in Agriculture, in Forestry, and in Home Technology. The faculty of the department had a wide range of expertise that handled academic and laboratory courses and the field and shop operations: in applied Agricultural Engineering; in Plain and Topographic Surveying; in Statistics, Mathematics, Physics, and in Agricultural Meteorology. At that time, the Head of Engineering was also *de facto* Head of the Physical Plant Services that included the power plant, the motor pool, the grounds and buildings services, and the experiment station farm services. Some of the engineers in the faculty were tapped to provide technical services to these units. About 7 of the faculty staff of the engineering department were hired from UP Diliman. Trivia, the LB campus was predominantly male, and female imports from Diliman were preferred for other departments offering basic courses in disciplines such as english, chemistry, botany, and the social sciences. Many of the lovely imports found their life-mates in Los Baños. The chapel was always busy administering the proper rites.

Ag Engineering in the 50's

Some of the aging senior faculty members of the departments of the College of Agriculture were of pre-world war II vintage that survived the war. Engineering had three such stalwarts, **Professor Alejandro Catambay** who obtained his MS (agricultural machinery) from the University of California at Davis, and who became head the Engineering Department, In-charge of the Physical Plant Unit for the campus, and Superintendent of the Farm Experiment Station, on a concurrent basis. **Professor Andres Aglibut** who earned his MS (water management) from the University of Iowa also served concurrently as Business Affairs Director of the Los Baños campus. **Mr. Laureano Bondoc** was the farm shop teacher, who could forge, shape, weld, anything made of steel, or do carpentry work. A fourth, but a post war graduate, **Mr. Ben Juliano,** was a wizard with farm machinery and internal combustion engines. The engineers from Diliman who came to Los Baños were hired primarily to teach math or physics, and were merely on a holding pattern until they found real engineering jobs. They consumed a lot of beer but accredited themselves very well in the classroom.

The early students of the department who majored in agricultural engineering graduated with a BS in Agriculture degree, major in Agricultural Engineering. Aside from the requirement of taking courses in the agricultural sciences, the engineering majors were well-trained in farm operations dealing with machinery for all facets of farm production, and in the water management of irrigated farms. They were good and very much in demand as Farm Managers in the large farm estates and haciendas of Mindanao, even as CEOs of machinery companies. The author remembers **Bert Uichanco** of GAMI, **Joe Saddul** of IH, **Cecilio Arboleda** of Animal Husbandry, Poultry Division who was a statistics major.There were many more graduates who did well in their careers. One notable graduate in this program is **Dr. Rey Lantin,** who joined the department and also became Dean of INSAET.

The Turning Point

The UP-Cornell program had a vision for the development of Philippine agriculture. It was in the works long before IRRI came into the scene, that the Philippines rice and corn industry would be pumped up to increase production. They foresaw the need for an engineer that specialized in grain science besides the many other aggie graduates of traditional disciplines to be trained in the US. **Professor Hoff** recommended his civil engineering assistant at the experiment station, to study in the US to extend his knowledge into agricultural engineering by working for a Master's degree major in grain processing engineering under a USAID/NEC scholarship. The Louisiana State University in Baton Rouge, which had a Rice Experiment Station in Crowley, La. was suggested.

At this time through a USAID assisted program, the Philippine government acquired three grain "elevators" in the country, these were bolted steel bulk silos equipped with ambient air aeration system, and some were complemented with 20 tons per hour continuous flow dryers with tempering bins, and the associated mechanical handling bucket elevators and conveyor belts. In addition, Butler-type corrugated steel bulk silos with screw type boom conveyors for loading and unloading

them, and fitted with aeration fans, were also acquired. These types of bulk systems were widely and commercially used in the grain production areas in the US. This 'modern' technological hardware, 20 complete units, were located all over the Philippines.

Government engineers were sent to the US to see how they operated their grain silos, "elevators" they called them, that is learn which buttons to push to get them running. This silo technology program bannered a new era in Philippine agriculture, of the country moving into modern high tech systems to increase productivity and was very much celebrated in newspapers. The news pictures showed the elevators breaking the skyline of the farms. They were very impressive. Unfortunately, no one among the bright boys of the State agencies was educated in the physics and engineering of grain processing and bulk storage systems. The elevator program for various reasons was a magnificent failure. In retrospect, the U.S./Phil government silo technology program, without retrofitting, was not compatible without farm production system, and our tropical humid climate. As a result, in short order thousands of tons of grain – palay and shelled corn, loaded into the silos were spoiled, the grain rotted in the silos. In-addition, the abrasive palay scoured the ducts and screw conveyors paper-thin. The rotting of the grain in the silos was a fateful lesson. It underscored the importance of agricultural engineering know-how in: grain anatomy and physiology, air psychrometry, fluid air mechanics, heat and mass transfer in heated air grain drying and storage, thermally induced convection and moisture migration, and much much more "karunungan" were needed, we were to find out later.

It was prophetic that grain drying engineering, and later on crop processing as a discipline ware included in the fellowship areas of study for a wide-ranging MSc and PhD program under a USAID and Rockefeller Fellowship Grants. This started UP Ag Engineering to pursue a more scientific and engineered approach to grain handling and processing to prevent the grain silo fiasco to happen ever again.

The Professional Agricultural Engineering Program at UP Los Baños

Realizing their place in the sun, the opportunity for growth and service to agriculture, the faculty of the department of agricultural engineering worked for the institution of the professional program in agricultural engineering, a program that offered a BS degree in Agricultural Engineering. When it was finally approved in the 1960s, it attracted students from all over the country and SE Asia into the program.

It was difficult during the pioneering years of the BS Ag Eng program. Our students had to go to UP Diliman for two years for their basic engineering science courses after their Freshman year in Los Baños, and return to Los Baños for the professional agricultural engineering courses in their fifth year. Only the farm-bred and dedicated students returned to Los Baños, the others shifted to mechanical engineering. It became obvious and imperative that the ag engineering faculty had to beefed up and prepared to offer basic engineering science courses in the Los Baños campus. Those who had a BS Agriculture degree and who majored in engineering were encouraged to go on study leave and enroll in the basic engineering courses in UP Diliman.

"In retrospect, the U.S./Phil government silo technology program was not compatible with our farm production system, and our tropical humid climate without retrofitting. As a result, in short order thousands of tons of grain – palay and shelled corn, loaded into the silos were spoiled, the grain rotted in the silos. In addition, the abrasive palay scoured the ducts and screw conveyors paper-thin. The rotted grain in the silos was a sad lesson."

The graduates in the professional BS Ag Engineering program were eligible to take the government board examination for agricultural engineers, and those that passed were conferred the professional title of Agricultural Engineer and are recognized as licensed engineers. The licensing of engineers to practice is to protect their clients in the industry from incompetent practitioners. Some graduates however who returned to manage their own farms, or to pursue graduate programs in the more benign disciplines such economics opted not to try the rigorous preparation for a board examination. It should be noted that the UP does not require Board Certification to teach in UP, as UP has a more stringent staff selection process and has a continuous evaluation of performance of its staff. As part of the overhaul, the other non-engineering disciplines such as mathematics and statistics that were with the department spun off to handle their own programs with the arts and sciences college.

With the approval of the BS Ag Eng program, the MS in Agricultural Engineering, Major in Crop Processing was instituted in the department. Several of the faculty from the department, and engineering graduates from other schools in the country opted to work for their Master's degree in this area of study. Some of these pioneering MS students in Crop Processing, later on continued their graduate programs to work for their PhD degrees abroad. The author takes pride in noting that these students later on became the pillars of the agricultural engineering profession. Some of them are **Drs. Ernie Lozada, Marietta Adriano, Silvestre Andales, Emerico Mendoza, Ulysses Acacio, Joselito dela Cruz, Max de Vera, Vir Gayanilo, Rosendo Rapusas, Cayetano**

Intong, Phan Hieu Hien from Vietnam, Maitre Neubanij from Thailand and a few more whose names escape me now. To those missing, send me a Christmas card.

Research in Agricultural Engineering

The department of agricultural engineering during those years in the 60's to the 80's had a vigorous research and extension program in power and machinery, farm water management, and agricultural crops processing engineering. Farm electricity, and farm structures, which are part of agricultural engineering programs in the US were not local priorities.

Power and Machinery

As part of the post war (WW-II) rehabilitation program, the agricultural engineering department was the recipient of a complete range of agricultural machinery from the US. The author remembers 65 and over HP tractors by Ford, International Harvester, Mason-Ferguson, etc., used as prime movers for moldboard plows, disk plows, cultivators, grain drills, and seeders. There were corn and rice combines, silage choppers, balers. There was even a Shanzer-Berico columnar continuous flow grain dryer complete with a torch burner, heat exchangers, auto-controls, for a 20 TPH grain input capacity. This unit never tasted a single grain of rice or corn. The engineering students however had a great time learning how to operate these big upland type farm machines.

There was no machinery for wet land rice growing at that time. The big machines were tried and they simply stalled in the mud. They tried floating the tractors with wide tracks, no luck. Agricultural engineering pioneered the development of the cage wheels to improve traction in the wet rice paddies. This had to be discarded later as it scoured the hard pan underneath the rice paddy.

When land reform was instituted, and the large estates were cut up into smaller farms, the need was the transition from large riding tractors to smaller units more suited for the wet land rice paddies. For more information in this program, **Dr. Rey Lantin** is the lead person.

Water Management in Ag Engineering

Professor Aglibut, with his irrigation boys, **Abe Caoili**, and the sub-division magnate **Valbuena** were busy measuring the water requirement of crops, i.e., water used and respired by the plant, water that evaporated, and water that percolated down through the soil. This was a basic study necessary to establish how much water was need needed to grow a crop in a given area, and during its different growth periods. While this was interesting, they finally discovered that in wet paddy rice growing, it was necessary to continuously submerge the soil surface as a weed control measure. The conveyance of irrigation water, however from the dams to the farms is a civil engineering function and was left alone.

Dr. Max Baradas, an irrigation man and climatologist of the department was pursuing water impounding in ponds during the rainy season for irrigation during the dry season. He was way ahead of the times. Unfortunately his services were needed upstairs.

Crop Processing in Ag Engineering

As Philippine agriculture developed, and **UPCA's Dr. Pedro Escuro**, a plant breeder pioneered the development of a good eating quality and high yielding rice variety, the C-4. This variety became widely popular in Asia. IRRI came in much later in 1964 and with all its resources produced the IR8 variety that was also higher yielding than the traditional varieties, and was a non-photo sensitive variety that could be grown all year round. These initial farm production success spikes indicated the need for technologies in mechanical handling of the increased harvest, the primary processing specifically cleaning and drying of the wet harvest of grain during the rainy season, the storage of increased volumes of harvest, and the production of milled rice that met the preferences of the consumer market. Entirely new ways of doing things (technology – soft and hard) were needed by industry.

In addition, the urgent need was for professionally trained agricultural engineers and a strengthened agricultural engineering department to respond to the challenges. Across the railroad, IRRI engineering with their well-endowed projects embarked on a frenzy of machinery development, nuts and bolts projects. The immediate problem with the higher yielding harvest was the threshing of the wet harvest. After millions of pesos, the IRRI axial mechanical flow thresher, produced by our graduates working with IRRI became a huge commercial success.

In grain processing, specifically in rice processing, the government through NFA abandoned the attempts to use the imported large capacity silo technology and turned to UPCA for assistance.

The UPCA Agricultural Engineering department, with its research assistants and graduate students in processing faced the challenge of understanding and developing rice process engineering, to start with. The anatomy and physiology of the grain was studied to understand the types and circumstances of grain quality deterioration such as discoloration, grain fissuring and breakage, and how to minimize if not altogether prevent it in the sequence of operations after harvest. The fluid mechanics in moving air against a resistive load, the energy requirements of drying with heated air for practical systems were studied. Here, the literature indicated that the rate of drying of the palay grain was critical to

developing fissures, this observation was found not the controlling factor in tropical climates where the air had to be heated to reduce its humidity for drying. The drying air temperature in relation to the heating of the grain was more critical. Graduate student **Emer Mendoza** established this. The late **Dr. Mendoza** established that the critical grain temperature for fissuring was 110°F or 43°C, and there are now operational techniques developed for preventing this high temperature fissuring. To understand how to dry the grain in a practical system, deep bin and flat bed dryers were constructed, fitted with air flow measuring ducts, static pressure ports, and thermocouples installed through the depth of the grain. It was concluded that the management of a deep bin with heated air was not a practical system for tropical application.

In addition, to the basic technology of drying the grain and preserving its milling quality in an actual or under field conditions was a more cerebral exercise. The UP agricultural engineering department therefore further sought an understanding of the application of heated air dryers in the farm and in commercial systems. A typical example is the flat bed dryer that was initially built as a laboratory dryer that was prematurely born and adopted. There was this urgent need for wet palay dryers, and the 2 ton batch capacity flat bed dryer was adopted by DA and the NFA. In all its simplicity, the physics and engineering is complex and have to be understood for it to operate successfully from a technical perspective, and later a new dimension was discovered in the utilization of the flat bed dryer as a farm dryer. It had to be resized and used as part of a farm production and marketing system; its architecture, manufacture, and use dictated its design capacity. The energy cost of heated air-drying is high and its use had to be integrated with the other processing operations to help pay for the energy cost. Properly done heated air drying was superior to improperly managed sun drying in terms of head rice and production and in preventing discoloration. The same rigor in working out the design and development process applies to all the other agricultural engineering utility designs; otherwise they wind up just beautiful non-functional nuts and bolts design.

Moving to more sophisticated technology, the LSU dryer model was adopted and studied which allow for design of specific capacities required by clients. Other researchers have localized the US model requiring tempering bins, with batch recirculating systems, that allow for tempering. The Philippine Grains Postproduction Consortium (PGPC), a collaboration of government research agencies involved in improving the grains postproduction industry has evolved their own commercial design.

Storage in bulk systems can be done in the tropics but also requires a clear understanding of the physics of convection currents generated by localized heating, and the minimum requirements for aeration.

All of this technology, or how things are done with the aid of ingenious devices, are for naught if they are not compatible with the farm production and grain marketing system. There are a number of systems or grain streams from the farm to the ultimate consumer, which require different technologies and scales. The bottom line is that the quality and cost must be acceptable to the consumer, and at the same time the profits to the farmer producing the palay and to the businessmen processing the grain must be equitable. The agricultural engineer has to deal with all these agricultural and business economic problems. This has lead to a realization in the International Development Research Centre (IDRC) funded research that there must be collaboration between the engineers and the addled headed economists, for a greater chance of success in the application of technology in industry.

"Extending technology is extending knowledge, not handling out or dole outs of hardware. The final arbiter of whether a technology that is laboratory proven, is whether it is accepted by the intended beneficiary. The parameters for acceptance is whether their productivity is improved, or in simple language, if it improved their profitability."

Extending PH Technology

Applied research to start with has to clearly define the problem(s), and state its objective vis-a-viz the problem issues. This means what does the project want to achieve, and how can it be verified at the end of the project. A project/program that cannot state its objective in a clear-cut fashion is doomed to fail. In addition research projects have to have a time line, and an ending, with out it is doomed and a waste of resources.

The other requirement of a research program is being able to identify its intended primary beneficiary. The natural sequel to a research program is the extension of the technology to the beneficiary. Extension research is the field for social scientists and should not be confused with the extension of technology.

Extending technology is extending knowledge, not handling out or dole outs of hardware. The final arbiter of whether a technology that is laboratory-proven, is whether it is accepted by the intended beneficiary. The parameters for acceptance is whether their productivity is improved, or in simple language whether it improved their profitability. More convenient ways of doing things at a high cost is not acceptable.

Professors as Industry Consultants

Engineering is the development and application of technology to solve problems. The value of engineers in the academic world is greatly enhanced by their acquiring what we flippantly call "combat experience". Engineers need to be well steeped in the engineering sciences but in practice they cannot be all theories. Professors therefore are urged, and they are allowed, to work part time as consultants in industry. We cannot know everything, but professors are also trained to research for the solutions, and the experience is that in many instances a good background in the basic engineering sciences saved the day.

The Institution of INSAET

The master plan of **UPLB Chancellor Samonte** was the development of Los Baños as a complete university campus. The agriculture college had to spin off its non-agriculture units for them to develop. At that time, there were noises about a full college of engineering on the campus. It was cautioned that a college of engineering needed a range of disciplines in the faculty and teaching laboratories. The strength of the LB campus however was in the biological sciences and it was a natural for agricultural engineering to build on that strength. A department of Agricultural Engineering merely servicing the UP College of Agriculture was constrained to grow. The performance of the Agricultural engineering faculty, its graduate students, and graduates was already recognized. The evolution therefore of the department of agricultural engineering to an Institute (INSAET) in 1977 as a separate institution in UPLB, was well-received. This move reinforced donor agencies to support projects in the old department.

Agricultural Machinery Testing and Evaluation Center

In 1976 or thereabouts, a hoof and mouth disease debilitated a great number of the farm work animals. Small tractors were needed to take their place. This demand created a frenzy to produce small non-riding tractors in the many small machine shops. This development was good, but it was observed that many of the small tractors were not well engineered and failed in the field. This led **Secretary Tanco** of the Department of Agriculture to request UPLB Ag Engineering to put up a small tractor testing and evaluation center to certify tractor designs and units produced that would be financed by the banks under the DA program. Thus, AMTEC was established, with agricultural engineer **Roberto Bautista** as its first Director. AMTEC has now a life of its own, under CEAT.

Regional Network for Agricultural Machiner/Agricultural Mechanization Development Program (RNAM/AMDP)

The new attention to farm mechanization led the Japanese aid agency to offer financial assistance for the creation of a network of agricultural machinery agencies engaged in design and manufacturing in the Asian region, under the United Nations – Economic and Social Council for Asia and the Pacific (UN/ESCAP). The idea for the network was to promote collaboration to accelerate development. **President Marcos** directed NEDA to make a bid for the Philippines to host the network. The Los Baños engineering was making waves, and DA and NEDA sought the collaboration of the UPLB Chancellor.

The author was sent by the Chancellor to ESCAP in Bangkok to participate in the development of a document formulating the proposal for a regional network for the ESCAP council to consider. During its deliberations the Philippines offered to host the network, and was accepted. RNAM was born, and **Secretary Tanco** of DA financed the establishment of the Agricultural Mechanization Development Program (AMDP), the Philippines agricultural mechanization program to be affiliated with the network. **Dr. Rey Lantin**, an agri-machinery man by choice and training, was nominated to be the Philippine representative to the RNAM staff. RNAM, later found out that Bangkok had a cooler climate, and transferred its offices there, but AMDP had already established a life of its own, and to this day operates under CEAT.

CEAT

The institution of the professional agricultural engineering program, and the development of a faculty that could handle the basic engineering sciences courses, spearheaded the offering by UPLB of the other professional engineering disciplines. It was projected by the seers of agriculture that other engineering disciplines would be in demand in the industrial park of the Calabarzon areas. It is now observed that with the quality of students entering UPLB, this to a great degree has help overcome the lack of engineering teachers with engineering combat experience, and laboratories to reinforce the learning process. It has been the personal observation in the industry and bureaucracy that the UPLB engineering graduates are well motivated, and can hold their own candle.

Finally, it is repeated in conclusion, that engineers well grounded in the basic engineering sciences as well as the professional courses, prepare them for developing and managing solutions to the many evolving engineering problems of Philippine agriculture with its own unique farm production system and tropical weather. Engineers equipped with physics of why things happen and their relevance to engineering science, are better prepared to develop solutions for real world application. This has been the guiding philosophy of the early years of the Department of Agricultural Engineering, and later INSAET. ■

REMINICENCES OF THE YEARS AT UPLB: COLLEGE OF ENGINEERING AND AGRO-INDUSTRIAL TECHNOLOGY

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Part 1 is a review which includes the first 50 years of the University of the Philippines College of Agriculture (UPCA), from which the University of the Philippines Los Baños (UPLB), and in turn the College of Engineering and Agro-industrial Technology (CEAT) evolved. It cites facts and events that are directly/indirectly related only to agricultural engineering for brevity. Some comments related to modern times have been made. The materials have been extracted mostly from the accounts of two first students of UPCA[1] and the College and Alumni Notes sections of The Philippine Agriculturist and Forester (now The Philippine Agricultural Scientist)[2]. As a student during 1955-1959, the author gives his personal account of experiences and observations during this College period, which started with a rare solar total eclipse and ended with UPCA's Golden Jubilee.

Part 2 is an account of the author's experiences and observations after his appointment as research instructor (item was later abolished) and ended upon his retirement with gaps in services for graduate studies and work in the United Nations (UN) and other international institutions. He was reinstated in 1997 and retired in 2004.

First 50 years of the Department of Agricultural Engineering in Relation to UPCA

The CEAT story is linked with the history of UPCA, which was founded on March 6, 1909 and became an autonomous university (University of the Philippines Los Baños (UPLB) of the University of the Philippines System (UPS) in 1972 starting with two colleges and three institutes.

In 1976, INSAET or Institute of Agricultural Engineering and Agro-industrial Technology with Dr. Dante B. de Padua as first dean, evolved from the Department of Agricultural Engineering and in 1983, became CEAT that included the Institute of Agricultural Engineering with its five divisions, and the Department of Chemical Engineering. The Sugar Technology curriculum was transferred to CEAT, from the Department of Agricultural Chemistry of the UPLB College of Arts and Sciences (CAS). CEAT later expanded to having the Departments of Civil Engineering (1992), Electrical Engineering (1996), and Industrial Engineering (1999).

As a leading institution and with its graduates consistently garnering the top 10 and near 100% passing in the engineering board examinations conducted by the Professional Regulation Commission, CEAT has been declared by the Commission on Higher Education (CHED) as a Center of Excellence in Agricultural Engineering in 2001.

The 2012 Centennial Anniversary of CEAT is reckoned from the establishment of the Department of Agricultural Engineering in 1912. The first head was **Prof. Albert George Glodt**, C.E., M.E. Prior to that date, rural engineering was a subject taught in the Department of Agronomy by Farm Superintendent **Harold Cuzner**, B.S. who also trained and supervised the first batch of students in clearing the jungle site of UPCA, surveying, laying out and cultivating the fields of the experiment station as well as doing masonry and building farm structures, including student, plant nursery and poultry houses, among other practical exercises in farm operations. For their convenience and efficiency of operations, students felled a large tree and made a log foot bridge with bamboo "sala-sala" flooring and railing across Molawin Creek. They also built a rock dam on the creek bed to irrigate the nursery and the gardens. They were guided by Prof. Cuzner who had an engineering background and a previous exploration assignment.

[1]Zamora, Jose F. 1959. Things that I remember of my school days. UPCA Golden Jubilee Souvenir Program. Zamora was one of the first of 12 students and one of three who graduated in 1911 with the degree of B Agr. During the 1950s he was a successful operator of the Golden Taxicab in Manila and a supporter for UPCA's development.

Vibar, Toribio N. 1911. The College of Agriculture. The Philippine Agriculturist and Forester. Volume 1, No. 1, January. The College of Agriculture, University of the Philippines, Los Baños, Laguna, Philippine Islands. Vibar became a faculty member of UPCA.

[2]The Philippine Agriculturist and Forester was initially an organ of the student body. It initially served as a chronicle of events as well as reports of research results and technical observations by students and later became The Philippine Agriculturist. In 2001, it became The Philippine Agricultural Scientist, a peer-reviewed scientific journal listed with ISI (Institute for Scientific Information), a database of journals based on published selection criteria and is an important indicator of journal quality and impact.

Vignettes of history during the founding years of UPCA Department of Agricultural Engineering

March 6, 1909	Founding of UPCA in Los Baños	Dr. Edwin B. Copeland, First Dean	Foundation site located at the T-junction of the National Highway and the Jamboree Road
First Semester, 1911-1912	Teaching of Rural engineering subject at Department of Agronomy	Prof. Harold Cuzner	Students cleared the jungle; laid out the Campus and Experiment Station; activities focused on practical work along lines of civil engineering.
First Semester, 1912-1913	Organization of the Department of Agricultural Engineering	Albert George Glodt, C. E., M. E., Assoc Prof. of Agricultural Engineering	First head of the Department of Agricultural Engineering

On October 5, 1909, classes were transferred to the first temporary building built on the site where the post office is now located. That was to be the site of the Department of English, which later became the Department of Languages. The ruins of its portal, which faced the Physical Science Building (former site of Plant Breeding Division), have been restored, together with the Poultry Husbandry portal as a project of Class 1960 for the UPLB Centennial in 2009.

One significant event during the early years was the outbreak of WWI in Europe in 1918. Students and faculty organized volunteer contingents with a view to defending democracy. However, just as they were to embark the train for camp training, the war ended. This was the origin of the Loyalty Day celebration to commemorate volunteerism on October 10, 1918.

Student activism during the early 1970s however, saw the celebration as an affront to nationalism and independence from America. As a result, the celebration was later toned down. There was a period when it was celebrated on the Sunday closest to October 10 with a view to attracting visitors but the effect was otherwise. The celebration date was reverted to October 10.

The term, “Los Baños Spirit” has referred to volunteerism and loyalty to alma mater. It invokes a special endearment term of camaraderie unique to UPLB and which makes an alumnus feel warmly and sincerely welcomed by a fellow alumnus anywhere, including abroad. Ironically, as commonly observed, the “spirit” mostly exists outside of Los Baños and becomes more intense as one gets farther away from eLBi (the current jargon among graduates referring to UPLB in their facebook, twitter and email messages).

The Department of Agricultural Engineering, precursor of CEAT - early beginnings

This was the first time an engineering-related subject was taught to the first batch of 12 UPCA students. Although graduates only of the intermediate grade school, they were prepared for college work, an indication of high quality basic education during that period. Surveying and Forest Engineering were offered during the last year of the four-year Forestry curriculum of the School of Forestry.

Figure 1. Agricultural Engineering building built in 1911
(Photo from the Philippine Agriculturist, Vol. XVIII, No. 5, Oct., 1929).

With the appointment of Albert George Glodt, C. E., M. E., as Associate Professor of Agricultural Engineering, the Department of Agricultural Engineering was established in 1912. Farm engineering was previously taught as a subject in the Department of Agronomy and handled by Prof. Harold Cuzner. This timeline forms the basis of the Centennial Celebration of CEAT in 2012.

During the initial years, the chemistry laboratory occupied the back wing of the building. Classes in mathematics, physics and statistics were held in this building by the Agricultural Engineering faculty, up to the early ‘70s when it was demolished to give way for the SEARCA building. The building was spared from Japanese soldiers’ campus destruction in February, 1945.

The period from 1910 to 1921 under Prof. Glodt and **Prof. Cuzner** was characterized by development of agricultural engineering along the lines of civil engineering. Emphasis was laid on surveying, mechanical drawing and planning of buildings with additional topics on sewage disposal plants, irrigation and drainage. Laboratory periods were spent on making projection drawings, graphical solutions of trusses and building an irrigation canal along Molawin Creek. The term plan consisting of three views of a house or a building with complete specifications was a requirement that delayed the graduation of some students who were not able to fulfill it on time.

Some of the early research projects consisted of the works of **Cuzner** in 1917 and 1918 on cassava starch extraction and tensile strength of grain stem. **Cuzner** had ideas in developing machinery but was not able to pursue the research because of his assignment to over-

see the construction of buildings and physical plant development.

The period from 1921 to 1929 was characterized by development of ideas along lines of power, machinery, building, sanitation, equipment, irrigation and drainage. After **Cuzner** left in 1921, Instructor **Anastacio Teodoro** introduced courses in farm mechanics, farm gas engines and farm machinery and was encouraged by the new department head, Prof. Irving Leonard, to pursue the development of the field.

Among Teodoro's research works were the analysis of draft of the native plows and the use of alcohol as fuel for small internal combustion engines. He later worked, together with **Santiago Cruz** and another student assistant on the use of different fuel combinations, a topic that caught the interest and collaboration of the sugar centrals, the petroleum and oil companies and engine manufacturers which supplied materials and equipment for the research.

Teodoro's other works consisted of utilizing flower pots as charcoal stoves in 1923; determining the strength of bamboo as affected by curing, comparing costs of operation between animal and tractor power use, and draft of different native plow designs in 1925; design of the new College Copra Drier in 1927; and studies of alcohol as engine fuel, mix of fuels for internal combustion engines in the early 1930s.

Dr. Alexander Gordon conducted studies of properties of concrete mixes and mortars and of several types of gravity gates. He designed a home-made simple surveyor's staff and conducted surveys of amount of water use by farmers in Calauan and Calamba during 1926-1929.

Teodoro and **Gordon** were later significant contributors of technical articles in the Philippine of Agricultural Engineering Journal, a publication of the Philippine Society of Agricultural Engineers, which they founded together with **Prof. Alejandro Catambay** and **Prof. Andres Aglibut** in 1950.

Teodoro pioneered work in biofuel research in the 1930s. His fuel mix of gasoline with 15-20 percent ethanol, dubbed "gasanol", was more efficient than pure gasoline. This 1929 DeSoto De Luxe car ran over 50,000 km. using gasanol for 5 years. On the foreground is a dynamometer used for measuring engine output power.

Instructor Felix Maramba, MS Agricultural Engineering '22, Iowa State University, handled the courses when Teodoro studied for PhD at the University of Nebraska, during 1926-1928. He would later pioneer on flour milling; built a breakthrough coconut oil-fueled power generator and a commercial scale biogas generation system integrated with piggery and meat processing plant in Antipolo, Rizal, which made it so self-sufficient in electric power that Meralco services were terminated. He was an exemplar of a practicing agricultural engineer and applying well-known but usually ignored technologies that made his enterprises lucrative. He was also a leader in waste management. He had donated books and other publications to the CEAT Library.

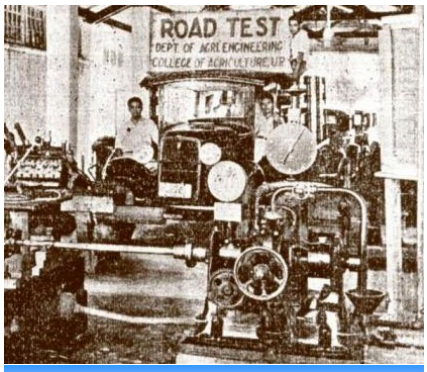

Figure 2. DeSoto De Luxe (1929) car which ran over 50,000 Km on gasanol for 5 years.

Dr. Maramba has shared a bit of wisdom to control worrying. His motto, which he usually applied after encountering an unfortunate episode, was "It could have been worse," because by just being alive, he stated, one could still hope to do something. He died at age 97.

Instructor **Jose Bondoc**, a graduate of the Philippine School of Arts and Trades and was the mainstay for carpentry and mechanical shop courses, made adaptations of the large soybean thresher for small-scale rice threshing in 1929.

Instruction – early curriculum

Farm engineering was a subject taught by **Prof. Harold Cuzner** in the Department of Agronomy before the Department of Agricultural Engineering was established in 1912.

The six-year Bachelor of Agriculture (B Agr) curriculum was offered to graduates of the intermediate grade school while the four-year Bachelor of Science in Agriculture (BSA) curriculum was offered to graduates of high school. A special technical two-year curriculum for intermediate grade school graduates was offered to enable them to take BSA without completing the 4-year high school because, according to **Dean Copeland**, this curriculum was considered superior to that of the regular high school, which contained subjects irrelevant to agriculture study. Apart from a saving of two years, the graduate turned out to be excellent.

The mathematics courses during the first three years of B Agr curriculum consisted of three semesters each for elementary algebra and plane trigonometry and one semester for combined trigonometry and surveying. Physics and agricultural engineering were offered during the second semester in the fourth year of B Agr and in the third year of BSA curriculum.

The students' mastery of English even as they finished only intermediate grade schooling was demonstrated by their publishing of the Philippine Agriculturist and Forester (Vol. I, No. 1 to 9), the organ of the Student Body, barely one year and six months after they started college at UPCA. There were no issues for April, May and December vacations. Started in January 1911, the journal comprised technical and semi-technical reports as well as the chronicle of events (College and Alumni News section). The journal is currently published by the College of Agriculture and has evolved into The Philippine Agricultural Scientist, an international journal of tropical agriculture and related sciences.

The following excerpt from Vol. I, No.9, 1911, refer to the activities of students taking courses in the Department of Rural Engineering:

> "Our frontispiece represents the farm engineering class at work on the construction of a cement floor for a model poultry house. Students learn by actual labor how to use concrete for making fence posts, floors, "arigues" and culverts. They are required to make out regular requisitions for materials for construction of various farm buildings. Plans are drawn of these buildings and lectures are given regarding location, sanitation, and water supply. Lectures and practical work are given on farm machinery and road building. During the first semester of the college year the students are taught irrigation and drainage, with attention to the measurement, control, and duty of water and the demands of different soils and crops."

In 1930, **Dr. Sam Trelease**, with assistance of the English department head, **Ms. Emma Yule,** wrote the manual on "Preparation of Scientific and Technical Papers" which eased their editing work of student theses and the Philippine Agriculturist. Strict editing for English grammar, spelling and syntax had been emphasized.

Later, **Dean Leopoldo B. Uichanco** (1939-1943; 1945-1959) was said to have read every thesis final manuscript before signing it and summoned the thesis faculty adviser to the Dean's Office if he encountered major mistakes in the English composition and grammar and required only three knocks at his office door to be welcome to his office. Quality of research output and presentation made UPCA a leading agricultural institution in Asia.

UPCA became the first unit of the University of the Philippines to open after the war when it resumed classes on July 25, 1945, with **Dr. Leopoldo Uichanco**, who was tortured by the Japanese soldiers on suspected aiding guerillas and Americans but saved from execution sentence, as reinstated dean. Japanese soldiers destroyed buildings and killed civilians in reprisal for the successful rescue at dawn of American and European civilians at the Los Baños Internment Camp by the combined land, air and water operations of the US Army 11th Airborne and the Filipino guerillas. The buildings were restored by 1949 out of American war damage funds and other sources.

Faculty development at the Department of Agricultural Engineering – 1950 - 1970

The pursuit of academic excellence has been aptly emphasized by former UPCA **Dean Bienvenido Gonzales**. He declared the following expectation of no less than excellent outputs from the faculty and students: "I want every product of this College, whether it be a student, a plant, a domestic animal, or a scientific paper, to bear a mark similar to that of 'sterling' in silver."

Faculty development was an important aspect of instruction. UPCA administration sought sponsors of fellowships to enable the faculty to take advanced studies abroad.

In 1952, **Dean Leopoldo Uichanco** initiated the UP-Cornell Contract where UPCA faculty would be given fellowships to study at Cornell University in Ithaca, New York and Cornell professors would visit UPCA and given housing and hospitality facilities. In 1959, **Dean Dioscoro Umali** who succeeded **Uichanco**, worked for the second phase as the UP-Cornell Graduate Education Program or UPCO with support from the Ford Foundation. The Department of Agricultural Engineering had four visiting professors and two graduate students from Cornell University. They conducted their PhD thesis research under their guidance of Cornell professors with UPCA professors in their graduate committee. Recipients of graduate fellowships for PhD under the UP-Cornell Program were **Senen Miranda** and **Emerico Mendoza** (†).

The UPCA faculty also availed themselves of other fellowships and graduate assistantships in the US universities. Upon their return with MS and PhD degrees, UPCA faculty was strengthened even more.

The Rockefeller Foundation sponsored during the late 1950s up to 1970s several graduate fellowships, to enable selected UPCA faculty to study for PhD in US universities. These fellowship grants were an offshoot of the efforts of its International Education Board head for Asia, **Dean H. R. Russell** of the College of Agriculture, University of Wisconsin, who visited UPCA in 1926. In gratitude for his efforts, UPCA had his name scripted on an arch standpipe (for the College water supply from Molawin Creek) beside the UPLB Library/Chancellor's Office building.

Among the recipients from the Department of Agricultural Engineering of the Rockefeller Fellowship grant for PhD were: **Dante B. de Padua** at Michigan State University; **Reynaldo M. Lantin** at Iowa State University; **Mariano de Ramos** (Statistics) at Cornell University and **Manuel Vergel** at the Iowa State University.

A new cadre of staff with advanced academic degrees succeeded the retired, resigned or deceased staff with PhD and MS degrees under the former government Pensionado Fellowship grants of which **Anastacio L. Teodoro, Alexander Gordon, Felix Maramba, Santiago Cruz, Alejandro Catambay** and **Andres P. Aglibut** had been recipients and had become the mainstay in the Department of Agricultural Engineering. **Dr. Juanito Ordoveza**, BSCE, UPD was the only engineering faculty with PhD during the late 1950s but did not stay long to manage the family sugarcane plantation in Negros and other concerns. He obtained his PhD degree from Cornell University under the Smith Mundt-Fulbright Fellowship grant.

The advanced study fever at the Department of Agricultural Engineering was initiated by **Petronio S. Ongkingco** who obtained his Doctor of Science (Dottore in Scienze Agrarie) degree from the University of Milan, Italy in 1961. In 1976, he obtained a PhD degree in Water Resources Administration from the University of Arizona. In 1958, **Angelito Sandoval** who studied for MS degree at Iowa State University, handled the agrometeorology courses and established the College Agrometeorology Station. He was pioneer in College in electronic computing applications. He used programs punched on IBM cards which were processed in the IBM company facilities in Cubao, Quezon City.

The IRRI research fellowship grants for MS in agricultural engineering (joint program with the College of Engineering and the UPLB Graduate School) were **Reynaldo M. Lantin, Abraham Caoili (†), Leopoldo Alicbusan (†), Virgilio Gayanilo, Vicente A. Uichanco** and **Arsenio Resurreccion**, who studied at the Iowa State University through the USAID-National Crop Protection Center (NCPC) Scholarship Grant. IRRI also granted a post-graduate research fellowship to **Wilfredo David** after taking his PhD from Iowa State University through a graduate assistantship grant. He later became Dean of CEAT and Chancellor of UPLB.

After his MS studies at Cornell University in 1958, **Roberto Bautista** BSA'56 toured 13 US universities and states. During his visit with the John Deere Company in Moline, Illinois, he chanced upon a cut-away John Deere tractor with animated moving parts which were chrome-plated. He remarked on its being very useful for agricultural engineering students at UPCA as they would appreciate how the engine and tractor worked. The John Deere Company arranged for the shipment of the tractor to the Philippines at no cost to UPCA.

In January, 2012, the Singapore-based John Deere Asia, through its distributor in the Philippines has offered to fully restore the tractor to its original state in 1959.

Dante de Padua, upon his return from MS study at Louisiana State University in 1958, introduced crop processing to the BSAE curriculum and became the mainstay for the field until he developed new faculty through MS graduate students with major in crop processing. After getting PhD degree from Michigan State University in 1965, he developed the Rice Milling Laboratory through an FAO-funded project. Under his guidance for MS he developed faculty members who got their PhDs abroad. They were Marietta Adriano (†) who pursued economics and later joined NEDA, **Emerico Mendoza** (†) and **Ulysses Acasio**, who later became staff of the Kansas State University as well as **Ernesto Lozada** and **Silvestre Andales**, who both became deans of CEAT.

Reynaldo Lantin who took the course from the distinguished professor of engineering mechanics at Iowa State University, introduced similitude as one of the graduate courses with the intent of using it also as a tool for conducting engineering research. While he developed simple instruments for performing in-house laboratory exercises through motivation of student creativity, he arranged for the use of instruments already existing in other departments of CEAT and AMTEC for some exercises.

He discovered that many teaching aids and modern instruments, which were needed for laboratory exercises and research, already existed, with quite a few lying idle in the laboratories and store rooms of the UP System units. While taking basic engineering courses at the College of Engineering in UPD in Summer, 1961, he borrowed the large slide rule teaching aid from **Dean Oscar Baguio**, who remarked, "ok, but take care of it like a lady's leg – no bruises." The remarkable thing about this brief negotiation was that there were no frills, MOA or investigation. **Dean Baguio** just relied on **Lantin's** word that he was instructor at UPCA engineering and a student at UPCE (he often met **Lantin**, who inadvertently eavesdropped on his interesting and hilarious engineering class sessions while waiting for the next class at the engineering hallway). The moral lesson is that inter-unit transactions need not be "red taped." While learning how to use a slide rule was a student's lookout, the mockup slide rule, which was the analog version of the scientific digital calculator became an effective student tutoring and group learning aid for new students. After all, carrying a slide rule was a distinguishing mark of agricultural engineering major and sugar technology students of the bygone era.

Lantin also explored laboratory facilities in the departments at UPCA and Forestry in UPLB and the College of Engineering (CE) and the Physics Laboratory in UPD as well as the research and materials testing laboratories in institutions like Forest Products Research Institute, where former agricultural engineering senior colleague **Dr. Rodolfo Yaptenco** was in charge of the testing laboratory. He also explored with the International Rice Research Institute Department of Agricultural Engineer-

ing, where he was at one time a research scholar. He sometimes conducted his laboratory classes in experimental stress analysis at the UPDCE to use the photoelastic polariscope for determining stress patterns in models of machine members.

Thus, Inter-unit usage of teaching and research laboratories could be arranged among sister units of UPS and may be institutionalized by the university to maximize usage of teaching and research facilities. Apart from economy, the transactions would lead to closer interactions among the faculty and among units of the university system.

The Department of Agricultural Engineering offered some agricultural engineering courses for agriculture students who have no or little engineering background. The BS Home Technology program which infused the UPCA Campus with women students, took the same courses in agricultural engineering as the agriculture students during the first two years. Their special course in shop work was memorable because they learned from **Prof. Jose Bondoc**, who handled carpentry and blacksmithing and occasionally power and machinery courses, the fabrication of useful household utensils and caponizing sets.

Engineering students would benefit from courses in workshop technologies for agro-industrial manufacturing, a step towards industrialization, which is a strategy for creating jobs in the rural areas and enticing the informal settlers in Metro Manila and urban areas to voluntarily return to their native provinces for better quality of life.

The courses in mathematics, physics and statistics, which the Department of Agricultural Engineering used to handle for the general education program of UPLB and for major courses in agricultural engineering and sugar technology curricula, are now handled by the College of Arts and Sciences.

The BS in Agricultural Engineering (BSAE) curriculum evolved from the BSA honors curriculum with major in agricultural engineering. The graduates of such curriculum who desired to pursue graduate studies in agricultural engineering had to take basic engineering courses, which were common to all fields of engineering.

The five-year BSAE curriculum was initially offered in 1953 as a joint program of UPCA (through the Department of Agricultural Engineering) and the College of Engineering in UPD. The agricultural engineering student had to take engineering courses during the first four years and basic agriculture courses during the last year at UPCA. Of the initial 23 students who intended to pursue BSAE under the program, only one, **Jose Saddul** graduated in 1959 followed by four who graduated in 1960. One of them, **Marietta Adriano**, the first woman agricultural engineering graduate, joined the faculty of the Department of Agricultural Engineering along with **Raquel Francisco**.

This low batting average for students to continue the course in agricultural engineering stemmed from the difficulty and hesitation of the student who had established roots in Diliman to continue studies under a new academic and social environment in Los Baños. Most freshmen students who enrolled for the BSAE shifted to other engineering programs in the College of Engineering. Efforts then were made at the Department of Agricultural Engineering to fully offer BSAE by developing the faculty to offer engineering science courses. Consequently, mechanical and civil engineering graduates from the College of Engineering were recruited for the faculty in addition to the ones already in place as a result of recruitment during the late 1950s to teach mathematics and physics courses.

Their stay as faculty of the Department of Agricultural Engineering however, was short and of the few who stayed on pursued further studies under various fellowships. Among them were civil engineering graduates, **Dante de Padua, Senen Miranda** and **Manuel Vergel** as well as mechanical engineering graduate, **Rodolfo Yaptengco** who later joined the College of Forestry faculty. While the fast turnover of faculty especially those assigned for teaching basic courses has the advantage of infusion of fresh ideas, it does not allow for the development of research capacities and interests. The transient nature of engineering faculty has been a major factor in the low research outputs from the department of agricultural engineering unlike in the agricultural sciences. The fast turnover state has existed since the early years of UPCA (American teachers had an average stay of only three years). However, the prospects of getting advanced degrees through fellowships and the favorable social, educational and physical environment at Los Baños to raise a family have been great incentives for some faculty to stay on.

The BS in Sugar Technology (BSST) was offered beginning in SY1920-1921. During the 1950s, the student had an option to specialize in either Sugar Engineering or Sugar Chemistry. The sugar engineering option had courses taken from the Department of Agricultural Engineering apart from the basic mathematics and physics courses normally taken by all students taking the BSA curriculum. Such courses included college algebra, solid geometry, descriptive geometry, analytic geometry, differential calculus and integral calculus, which were also taken by the UPCA students with major in agricultural engineering. The sugar chemistry option had courses taken from the Department of Agricultural Chemistry.

The two curricular offerings, BSAE and BSST were the precursors of courses offered by CEAT and the departments offering them. New departments as we have today were formed during the late ‘70s through the ‘90s.

The impressive faculty profile made UPCA an educational institution with the highest concentration of PhD in the Philippines and became a leader in providing excellent education in agriculture in Asia. Thus, a new chapter in the further development of UPCA was opened which led to the offering of the agricultural engineering curriculum.

The next development plan would be the improvement of the education infrastructures – buildings, laboratory facilities – even as faculty development was sustained. The "idol effect" inspired the junior faculty to seek graduate studies locally and abroad.

Student life in the '50s

The enhanced faculty and rehabilitated facilities made UPCA a premier agricultural institution and set the stage for the influx of students from all over the Philippines and from Southeast Asian countries starting in the mid-1950s. It also set the stage for the emerging strength of the agricultural engineering discipline.

Figure 3. College gate, circa 1955.

By 1955, UPCA attracted foreign students from Thailand, Indonesia, Vietnam, Burma, Sarawak in Borneo, Cambodia, Laos, Western Samoa, Solomon Islands and Fiji under various international fellowship grants-in-aid programs in their countries. Many students from Thailand and Indonesia undergraduate students personally financed their own studies. After graduation, they occupied key government positions in their countries. They also celebrated the Loyalty Day together with Filipino UPCA alumni working as consultants in their countries.

Coincidentally, there was also influx of students from all over the Philippines wanting to study agriculture, partly because of the campaign of then **President Ramon Magsaysay** to develop agriculture particularly Palawan and Mindanao, which he called "Land of Promise" to encourage settlers from Luzon.

Most students walked or rode on bicycles to the Campus from their boarding houses in Grove and Lopez Avenue. Only three jeepneys (auto calesas with sitting capacity of 9 persons) plied the campus with fare of five centavos. Only one vehicle could pass through the gate at a time. During the early 1970s student activists sometimes barricaded the gate to dramatize their cause.

Many sons of large-scale sugarcane planters or "sugar barons," as they were called then because of flashy lifestyle after the milling season in Negros and Iloilo, also enrolled at UPCA. They mingled with their classmates who mostly came from poor families; enjoyed the experience and led them to have a desirable outlook in life even as some of them sported top-of-the-line US-made motorcycles.

The presence of foreign students including the sons and daughters of American visiting professors from Cornell University gave the campus a cosmopolitan character even as the local students "came from all the regions of these Islands fair." The ladies comprising the ROTC Corps of Sponsors, which also included foreign students, were called the "cream of campus beauties" and were a special attraction during the parade and review of the Corps of Cadets.

The BS Agriculture major in agricultural engineering was a popular field of specialization by students under the honors curriculum. However, many of them realized a lack of basic engineering courses as instruction dealt mostly with practical applications which were not new to those who had farming background. They shifted to science-based agricultural fields of study when they pursued graduate studies but considered themselves as well-prepared and had advantage because of the engineering discipline that they had acquired from the major engineering courses.

Among them was **Dr. Jose Eusebio,** BSA '54 with major in agricultural engineering. As student, he worked closely with **Dr. Goodman**, Cornell University Visiting Professor in surveying and establishing surveying benchmarks in the Central Experiment Station and in the Campus. Some of these benchmarks were occasionally utilized in surveying field classes of CEAT students. After graduation, he specialized in animal science for MS and PhD major in swine. His agricultural engineering background enabled him to design and develop in 1974 a model of a biogas generator using pig manure and windmill as part of an integrated plant-animal farming system that included pigs, fish, *Chlorella* algae and vegetables. He pioneered in demonstrating the utilization of biogas from pig manure in cooking stove, heating water, lighting using a Coleman lantern and refrigerating using an Electrolux refrigerator, which used the absorption refrigeration system.

The BS Agriculture curriculum for agricultural engineering majors was greatly improved through enrichment of the technical content in engineering courses. Laboratory exercises for determining engine horsepower using the prony brake, determining engine timing using the trammel method and many others involving computations effectively established the engineering analysis discipline unlike the older batch of student majors who opted to take advanced degrees in other fields of agriculture.

Pre-CEAT campus developments, late 1960s – early 1970s

The Five-year Development Program, which was funded through a World Bank loan, was launched by UPCA **Dean Dioscoro Umali** in 1964 but construction spilled over to the early 1970s. The uphill attempt to get the loan, the first educational development type encountered by the bank, almost resulted in "por nada," or failure. The camel's back so to speak, was broken by the witty remarks at the last minute by the major proponents, Dr. Orlando Sacay and **Dr. Nathaniel Tablante**. They sort of justified (with computations) the loan by stating that with just one extra egg to be laid per year by each hen successfully developed by UPCA because of improved instruction and research facilities, the loan could be easily repaid. It was said that the remark tipped the balance favorably at the verge of being disapproved.

The program brought in a flurry of construction activities which disrupted the scheduling of classes and temporarily relocating the offices in other buildings made the campus look like an evacuation center with the engineering shop occupied by Botany and Animal science by Plant Pathology.

The original Agricultural Engineering building was one of the last ones to be demolished to give way for the SEARCA building because there would be problems in venues for holding mathematics, physics and statistics classes. Construction workers encountered difficulties tearing down the Administration building, which was built in 1911, because of the "materiales fuertes" used, typical of the construction during pre-war (WWII) or "peace time" (1903- 1941).

In the meantime, a committee formed by **Dr. Dioscoro L. Umali**, UP Vice-president for Agriculture Affairs and headed by **Dr. Fernando Bernardo** with **Dr. Reynaldo M. Lantin** as one of the members, proposed for autonomy of UPCA from UPD because of difficulties in getting budget and curricular matter approval. The result wasthe historical transformation in 1972 of UPCA into an autonomous university, the first one under the UP System. Other autonomous universities would be formed in subsequent years.

By virtue of Presidential Decree No. 58 on November 20, 1972, UPCA was transformed into an autonomous university, UPLB, the first one in the UP System. **Dr. Abelardo B. Samonte**, a political science professor in UPD, was the first Chancellor of UPLB.

By 1975, the new agricultural engineering building was finished in time for the significant institutional transformation and development of the Department of Agricultural Engineering.

Institute of Agricultural Engineering and Agro-Industrial Technology, 1976-1979

In 1976, **Chancellor Samonte** transformed the Department of Agricultural Engineering into the Institute of Agricultural Engineering and Agro-industrial Technology (INSAET) with **Dr. Dante B. de Padua** as first dean. Shortly after, however, he resigned to handle the International Development Research Center's SEARCA-based to Singapore on Asian region postharvest technology development and extension. **Dr. Reynaldo M. Lantin** took over as dean.

The handling of courses in mathematics, physics and statistics was transferred to the College of Arts and Sciences. INSAET had five departments, namely, Engineering Science, Power and Machinery, Soil and Water, Crop Processing and Farm Structures, and Agrometeorology. The Department of Soil and Water (originally Irrigation and Drainage) was changed to Land and Water. The Department of Agrometeorology handled Farm Structures.

Chancellor Samonte died in 1978. **Dr. Emil Q. Javier**, who succeeded him as Chancellor in 1979, continued reorganizing UPLB into more colleges and institutes. Envisioning the need for engineers to support the Calabarzon (Cavite, Laguna, Batangas, Quezon) agricultural and industrial development zone, **Chancellor Javier** upgraded INSAET into a full-pledged college - CEAT.

College of Engineering and Agro-Industrial Technology, 1979-present

CEAT, which evolved from INSAET, included initially the Institute of Agricultural Engineering, the Department of Chemical Engineering which handled the Sugar technology courses originally with the Department of Agricultural Chemistry, Civil Engineering, Electrical Engineering and Industrial Engineering.

Figure 4. The first CEAT (formerly INSAET) building constructed in 1975 as part of the Five-year Development Program of UPCA

The CEAT building housed the CEAT Dean's Office, the Secretary's Office and the four department offices, lecture hall, classrooms and the hydraulic laboratory. Farm power and machinery and crop processing laboratories and mechanical, blacksmithing and carpentry workshop

Table. The list of CEAT/INSAET/Dept of Agricultural Engineering Heads, 1912 to present

Name	Tenure of Office	Name	Tenure of Office
HEADS OF THE DEPARTMENT OF AGRICULTURAL ENGINEERING (1912-1976)		DEANS OF INSAET (1976-1979)	
Albert George Glodt	1912 – 1914	Dante B. de Padua	1976
Harold Cuzner	1915-1921	Reynaldo M. Lantin	1976 – 1978
Irving Leonard	1922	DEANS 0F CEAT (1976 - present)	
C. P. Johnson	1923	Reynaldo M. Lantin	1979 – 1983
Anastacio L. Teodoro	1924-1926	Ernesto P. Lozada	1984-1986
Alexander Gordon	1926-1929	Silvestre C. Andales	1986-1987
Alejandro B. Catambay	1945 - 1960	Wilfredo P. David	1987-1992
Angelito R. Sandoval (OIC)	1960-1961	Ernesto P. Lozada	1993-1998
Petronio S. Ongkingko	1962-1965	Virgilio G. Gayanilo	1998-2001
Dante B. de Padua	1966-1976	Reynaldo I. Acda	2002-2005
		Victor B. Ella	2005-2008
		Arsenio N. Resurreccion	2008-2011
		Arnold R. Elepaño	2011-present

Source: Philippine Agriculturist and based on recollections

were housed at the Farm Machinery building. Extension buildings now house the Department of Chemical Engineering and Department of Civil Engineering in the same compound. The list of CEAT/INSAET/Dept of Agricultural Engineering Heads is presented in Table 1.

REMINISCENCES OF CEAT (1955 -1959, 1959 – 1983 and 1997-2004)

This history of the College of Engineering and Agro-industrial Technology (CEAT) includes reminiscences as a student (1955 -1959) and as a faculty in UPLB (1959 – 1983 and 1997-2004).

Student Years 1955-1959, UPCA

The influx of about 1,500 new freshmen (national and foreign) in June, 1955, the largest in the history of the UPCA, resulted in shortages of instructors, classrooms and dormitory facilities. Lecture halls overflowed with new students. During the first semester, 1955-56, some students took lecture notes standing outside the windows or sitting on the lecture stage platform. The top fresh graduates of UPCA Class ’55 were recruited into the faculty. Their initial duties included assisting the senior lecturers in the large lecture classes and handling the laboratory classes.

UPCA recruited new graduates from the UPD College of Engineering and the College of Liberal Arts to handle mathematics, physics and statistics courses in the Department of Agricultural Engineering. Unlike the newly recruited UPCA graduates who stayed on until retirement or had become professors, most of the UPD graduates did not stay long enough to establish teaching and research careers at UPCA. Turn-over of faculty in these basic fields was high and they did not have research and extension activities.

Most of the new instructors were noted disciplinarians (dubbed by students as terrors) who strictly monitored class attendance and promptness as well as implemented the honesty rules during examinations. Many students who chose to ignore the rules were expelled from the university after due process. Those who could not cope with the tough college work were classified as extreme delinquents. By the Second Semester, 1955-56 almost half of the new freshman had quitted and either changed fields of study or transferred to agricultural schools.

Faculty and student evaluation issues

Until the 1990s, the student evaluation of instructors had been voluntary and at the initiative of the instructor for his/her self-improvement in teaching unlike today when evaluation is mandatory and its results used as a criterion for promotion of the instructor. The present system tends to make the instructor lenient in giving examinations and grades in exchange for high scores in the evaluation (a mode of corruption).

There was an argument that the student’s first semester stay was a better gauge of his/her future performance than the UPCAT. Many of those who survived the first semester in Batch ’55 were able to complete the four-year course and excelled in their chosen fields of practice, some even remote from agriculture.

As a lesson in the case of Freshmen Batch ’55, selective admission was implemented for Freshmen Batch ’56 students by limiting admission to those whose grade point average in high school was 85 and above. There was indication of effectiveness of the selective admission. The percentage of those who graduated markedly improved from 26% in the case of Freshmen Batch ’55 to 40% in the case of Freshmen Batch ’56, which also had several achievers among the graduates.

A system to help the poor, but talented and deserving students, was the provision of student assistantship. This practice which enabled many students from all over the Philippines to study at UPCA and excelled in their careers. UPCA had been noted as a low cost institution for college work since 1909, a reason for the increased enrollment.

Instruction

There were 40 faculty members at the Department of Agricultural Engineering, about 50% of whom were full time, teaching mathematics, physics and statistics which were service courses for agriculture and forestry

students. The rest were teaching agricultural engineering courses, but also had teaching loads in the mathematics and physics.

Under the UP-Cornell Contract aimed at faculty development particularly in research through collaboration with the faculty, there were five visiting professors and three graduate students from Cornell University as their advisees for conducting PhD thesis research.

The development of CEAT as center of excellence in engineering and agro-industrial technology can be traced with the development of the faculty and the curriculum more than the development of buildings and facilities.[3]

During 1955-1959, the Department of Agricultural Engineering under UPCA had only four divisions, namely, Farm power and machinery which was headed by **Prof. Alejandro Catambay**; Irrigation and drainage, headed by **Prof. Andres P. Aglibut**; Agrometeorology, headed by **Instructor Angelito Sandoval** who later also established the College Agrometeorology Station and Crop processing and structures, newly introduced and headed by **Prof. Dante de Padua**.

Instructor **Sandoval** pioneered in electronic computing in the campus in 1958 after his return from MS study in the US. The technology then consisted of noisily punched cards based on written program. He had to travel to IBM office in Cubao to run and debug the program. The office was then located at a portion of the library (now Humanities building).

Dr. Petronio Onkingko got a degree of Doctor of Science from the University of Milan, Italy and became the mainstay of the Agrometeorology section when Sandoval resigned for further studies. He was assisted by **Reynaldo Lantin**, **Rizalino Gregorio** (†) and **Reynaldo Castillo**. **Maximo W. Baradas** (†), PhD, University of Wisconsin took over a few years later. His contemporary was **Avelino Ramirez** (†). Meanwhile, **Nolasco Baldazo** and **Manuel Tamisin** were weather observers and analysts.

An addition to the field of study in agricultural engineering was Crop Processing which came after the return in 1958 of **Dante de Padua** who got an MS degree from Louisiana State University. In 1962, he pursued his PHD degree from Michigan State University and became the mainstay of the Crop Processing section as well as head of the Department of Agricultural Engineering when **Prof. Catambay** retired. Through the FAO-funded project, he established the Rice Milling Laboratory for training of grain milling technicians and for instruction purposes. He also developed a batch of graduate students for MS degree each of whom excelled in the field and later got PhDs from abroad. Most of them joined the faculty of the Department of Agricultural Engineering. Among them were the **Marrieta Adriano** who pursued PhD in economics and worked with NEDA, **Dr. Virgilio Gayanilo**, **Ernesto Lozada** and **Silvestre Andales** who later became deans of CEAT.

Statistics, Mathematics and Physics Section, which was originally headed by **Dr. Burton Oñate** was further developed by Prof. Amador Yñiguez, **Dr. Mariano Ramos,** and **Dr. Santiago Alviar**. The instructors for mathematics and physics mostly came from UPD but did not stay long at UPLB. Statistics was required for the BS agriculture curriculum.

Research in agricultural engineering

Research projects were undertaken only by faculty members in the agricultural engineering divisions of power and machinery, irrigation and drainage, agrometeorology and later, crop processing.

Prof. Alejandro Catambay implemented a project on small tools and implements under funding by the Presidential Assistant on Community Development Program (PACD) during the incumbency of President Ramon Magsaysay. He collected tools and implements typically used by farmers all over the Philippines for improvement in efficiency and reduction in cost of fabrication like using a straight rather than curved beam. Improved models were extended to farmers but for some reason the project was not completed.

In 1958, **Dr. Juanito Ordoveza**, BSCE from UPD and PhD from Cornell University, joined the faculty of agricultural engineering department and taught irrigation and drainage. He conducted experiments on the use of bamboo pipes for underground drains at the waterlogged plot bounded by the Pili Drive, the Maahas Road and the creek at the Central Experiment Station. The pyramid-shaped stack of bamboo pole sections with gaps and holes effectively drained the water towards the creek and complemented the underground cement tile drainage system laid earlier by **Dr. Hoff**, Cornell University visiting professor assisted by young engineer **Dante de Padua**.

Dr. Dante de Padua pioneered during the 1960s in the design of a flat-bed batch rice drier made of plywood bin and heated by a kerosene stove burner. This design was adapted by manufacturers including those in Taiwan (using sheet metal for bins) and is now the basis of design of flat-bed driers being distributed by the Department of Agriculture to farmers.

Dr. Ernesto P. Lozada designed the small-scale coconut drier to produce high quality copra with white meat. That design has been adapted in Solomon Islands.

[3]Pilosopong Tacio say: "I would prefer to be taught and inspired by a Socrates, an Einstein or an Aristotle under a mango tree than by a mediocre teacher in a modern classroom with excellent facilities."

The Agricultural Mechanization Development Program (AMDP), counterpart program of RNAM (now UNAPCAEM), an international UN organization, has been undertaking research in machinery designs for corn high value crops and upland crops mechanization and disseminate mechanization technologies to farmers and machinery manufacturers. AMDP along with AMTEC (Agricultural Machinery Testing and Evaluation Center), may now take advantage of the current thrust of DA to modernize agriculture through mechanization, a long-time advocacy of AMDP that had not succeeded with past administrations.

AMDP had been active in networking with government agencies and state agricultural universities for formulating strategies for agricultural mechanization and advocating certain support policies that would industrialize agriculture and promote local machinery manufacture for job creation and mechanizing agriculture to increase productivity. The proposal of an inter-agency committee to the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD) and to Philippine Council for Industry and Energy Research and Development (PCIERD) to revive the manufacture of the 10-horsepwer diesel engine has been systematically blocked by the lobbying of engine importers and distributors and delayed by the PCGG unresolved sequestration court case for the past 26 years of a company that already produced prototypes of the engine. Their old line was that local engine manufacture would not prosper because of lack of local market. Yet, the Philippines has become a lucrative market for small engines, the workhorse of farmers, fishermen and small-time construction contractors, imported from China, Thailand, Vietnam, Malaysia and Indonesia, which engaged in engine manufacture years after the Philippine company started it in 1978 (see previous topic on research and machinery testing).

The CEAT Department of Chemical Engineering and the Institute of Agricultural Engineering are involved in the UPLB Biofuel research, which was started in 2007. It is a revival of sorts of the work of Teodoro in agricultural engineering. This program has considered new sources of biofuel, such as coconut, *Moringa oleifera*, and sunflower seed. Efforts have been concentrated on the *Jatropha curcas* because of its low maintenance and fast yield. Coconut biofuel has been found too costly to be financially viable at the present time but can be a reserve resource in case of scarcity of fossil fuels in the future. Biofuel from *Sorghum bicolor*, *Manihot esculenta crantz* and *Chlorella vulgaris* are also being studied.

Instruction and research facilities

In August 1924, Representatives **Confesor** and **Festin** criticized in the Philippines Herald newspaper the lack of practical work and use of modern farm machinery at the agricultural engineering in College. In response, the UPCA **Dean Baker** invited them to visit the department. Later, **Confesor** fathered a bill for special appropriation of P10,000 for the Department of Agricultural Engineering. It was approved and in 1925, the following were purchased out of the amount:

Two tractors, 1 Ford chassis, 4 small gas engines, 1 big gas engine, 1 small rice thresher, 5 types of pump, 1 kW generator, 1 complete 600-W Delco plant, 1 gang plow, 3 small walking plows, P1000 worth of supplies, forges, hammers, planes, saws and other carpentry tools for the blacksmithing and carpentry division and P400 worth of agricultural engineering books and journals.

The agricultural engineering laboratory (building) which initially housed the chemistry laboratory was one of the six permanent buildings inaugurated in 1911 and was one of three original UPCA buildings that were not destroyed during WWII. It housed the agricultural engineering faculty offices (later only mathematics, physics and statistics), laboratory rooms and two lecture halls. The building was demolished during the 1970s to house the SEARCA building.

The Farm Machinery building at Pili Drive was initially for machinery and corn storage. Later, it was converted into the department of agricultural engineering proper, housing the faculty, lecture hall, farm machinery and crop processing laboratories and shop.

The New Agricultural Engineering Building at the corner of Pili Drive and Lanzones Road was constructed as part of the Five-Year Development Program (1964-1968) and initially housed the Dean's Office and the agricultural engineering departments. The change in the peso-dollar exchange rate from P4/$ to P11/$ in 1970 as well as the declaration of martial law in 1972 and the oil crisis in 1973 stopped the construction of the third wing. The Department of Chemical Engineering now occupies an extension building.

During 1978-1991, CEAT hosted the headquarters of the Regional Network for Agricultural Machinery (RNAM), a project funded by UNDP (United Nations Development Program) and executed by ESCAP (Economic and Social Commission for Asia and the Pacific). Starting in 1992, the RNAM building was renovated to house the Department of Civil Engineering with classrooms and laboratories added. The CEAT dean has been the country representative to the Technical Advisory Committee of RNAM, which transferred to Bangkok and after 1997 has taken a different name and accorded the status of a UN agency, UNAPCAEM (United Nations Asia Pacific Center for Agricultural Engineering and Machinery) with headquarters now based in Beijing upon invitation of China.

In rejecting the offer to host the UNAPCAEM as in the case of ESCAP in the 1950s, the Philippines had lost a

golden opportunity to attract foreign investments. By delaying the case of sequestration of a company that was successful in manufacturing a small diesel engine, the Philippines also lost the opportunity to be leader in engine manufacturing in Southeast Asia.

An extension building of the Farm Machinery building was constructed to house the AMDP. A new building was added for the Department of Electrical Engineering which also housed the Office of the Dean, the Office of the College Secretary and the CEAT Library. Yet another building at the site of the former UPCA power plant was added for the Department of Industrial Engineering.

In 1977, the construction of the AMTEC building was funded by the Department of Agriculture, which needed the services of a machinery testing facility. **Prof. Roberto Bautista** was appointed the first director of AMTEC. The AMTEC building also houses the Agricultural Machinery Division of the Institute of Agricultural Engineering.

CEAT after the 1970s.

The Industrial Engineering Building was the former site of the UPCA electrical power plant. The Agricultural Machinery Testing and Evaluation Center Building was built through a grant by the Department of Agriculture during the early 1970s to support the agricultural mechanization thrust through high standards of quality of agricultural machinery.

Thus, CEAT has developed considerably in terms of structures and instructional facilities as well as the faculty. If the Engineering Board Examinations is a gauge of academic instruction excellence CEAT stands out as one of the best engineering education colleges as its graduates have consistently had 100 percent passing and topped the examinations.

The Sugar Technology course was initially handled by the UPCA Department Agricultural Chemistry. Agricultural engineering was a major field of study under the BS Agriculture curriculum. The first BSAE graduate was in 1959 under the joint program of UPCA with the College of Engineering at UPD. This BSAE curriculum was started in 1953 for students who wished to opt for BSAE. The student took engineering sciences and AE-related courses in mechanical, electrical, civil and chemical engineering for four years then took agriculture and agricultural engineering courses during their fifth and last year at UPCA. Graduation was at UPD as did for all other students in BSA and BSF. Because the student has already established roots at UPD, only a few opted for the BSAE curriculum.

Improvement of instruction

There is always room for improvement. The faculty on their own initiative may engage in self-improvement activities such as pubic speaking, learning new techniques in teaching (e.g. twinning, a technique developed and practiced at the Iowa State University College of Engineering) and creative thinking. Real-life problem solving can be exciting for students. Examples are solving the traffic problem at Crossing, Los Baños by civil engineering students; spraying of tall coconut trees infested by coconut scale insects and controlled sun drying of pandan leaves in Louisiana, Laguna and manufacture of biodegradable bags using abaca, pandan and coconut leaves, bamboo and rattan; design of toilet to generate biogas and organic fertilizer from human, animal and biomass wastes as raw materials; and mechanizing the SRI (System of Rice Intensification), a rice production technique that produced record 22 tons per ha of palay in India. by agricultural engineering students.

My experiences as undergraduate student, 1955 – 1959

I belonged to Freshmen Batch 1955 or Graduating Class 1959, the largest class of new freshman ever for the 4-year BSA course. There was no UPCAT then and the entrance requirement was only a high school graduate from a government-recognized school. There were so many in our batch that lack of instructors and classrooms became a problem. To cope with the problem, most of the top graduates of Class 1955 were recruited as new instructors. There was infusion of new graduates of civil and mechanical engineering from UPD into the faculty of the agricultural engineering department which was handling the mathematics, physics and statistics courses.

I remember making walk-runs from Animal Husbandry building to Entomology building (now CHE building) in 10 minutes to be on time for the lecture of **Dr. Silverio Cendaña** and to compete for a seat at the lecture hall because chairs and spaces were lacking. Late students took notes outside the hall by the window or sat at the stage platform.

Sometimes three sections were combined into one lecture class. The lecturer was assisted by an instructor. Cheating was punishable by dismissal from the university and it did not matter whether one was graduating or not during his/her last semester.

In Summer, 1956 I took the analytic geometry course with classmates from sugar technology curriculum. Between class periods I worked as student assistant in the College Library by removing the glossy flaps of new book arrivals for disposal and assisting in classifying the books for painting the call numbers at the bindery. **Mr.**

Engrasio Basio, the Librarian permitted me to have some glossy flaps, which I used as scratch paper for practice solving mathematics problems. With abundance of scratch paper supply, I was able to get a lot of practice which helped develop solutions, avoid typographical errors, perform fast mathematical operations with accuracy. The principle was "practice makes perfect" as most errors in solving problems stemmed not as much from not knowing the solution as in being careless in writing or making typographical errors. The discipline of accuracy came in handy in writing the exacting FORTRAN computer programs for punching in IBM cards during the late 1960s when I was pursuing graduate studies. The advancements in computing technology have been staggering since then. The mechanical "x-y simplotter," which took minutes to perform and was considered a breakthrough, was a far cry from modern computer programs.

After Summer 1956, I was granted the first STANVAC (Standard Vacuum Oil Co.) Scholarship in agricultural engineering. Other scholars of STANVAC, which was the forerunner of Filoil, ESSO Philippines and Petron during the succeeding years, were Rodolfo Reyes, who worked at IRRI after graduation and Maximo de Vera who joined the agricultural engineering faculty and later UNFAO as hydrologist for six years.

I learned later from interviews of my batchmate that some of them were influenced by then **President Ramon Magsaysay** to take up agriculture on account of his land resettlement program to decongest Manila and environs and to fulfill his promise to the Hukbalahaps turned rebels who surrendered to the government. Many of them availed of land ownership in Mindanao called then as the "Land of Promise" and Palawan. Each family was given a carabao, a plow and harrow plus a monthly supply of rice for two years, the period when their crop production would have stabilized. The government assisted them in major land clearing of forests for agricultural purposes using crawler tractors and bulldozers. Eventually most graduates of UPCA were hired as agriculture extension workers. However, some co-graduates pursued other courses such as law and medicine. One became a jet pilot in the Philippine Air Force with a job of interceptor of unauthorized planes intruding the Philippine air space.

Cost of studies at UPCA during the 1950s was low and affordable as in the pioneering days of UPCA. In fact, most of the students came from poor families. Tuition and miscellaneous fees at UPCA amounted to about P100 only; board and lodging was about P8/month and most students cooked their own meals, mostly in groups to save even more. The most popular eating place was the Hongkong Restaurant located where Boston Café now stands. A birthday celebrant can give a sumptuous blowout for a group of friends for only about P20, which can buy pancit bihon, hot pandesal and Magnolia ice cream bricks (no longer produced). One could spend a weekend day in Manila with P5 in his pocket (one-way bus fare was P0.65 at the BLTB Co. bus and jeepney fare was P0.05 and can still watch the first-run movies in Odion, Galaxy and other theaters with plenty of money to spare. He can invite his companion to eat chicken mami at the popular Ma Mon Luk in Quiapo, an eating place so busy that the wooden floor is almost never had seen cleaning. In the beginning, only 3 small jeepneys (called auto-calesas) plied the whole campus as students either had bikes or just walked from building to building classrooms and lecture hall in 10 minutes. Strict and disciplinarian lecturers and their assistant instructors would close the doors of the lecture hall at the exact sound of the third siren which we still hear today to tell time on the hour. During those days there were three sirens – first to dismiss the class at 10 minutes before the hour, then a second siren at 5 minutes before the hour and the third at the hour. During the 10-minute class breaks, the students without bikes had to run full speed to catch the class at Agricultural Economics (now CEM) coming from Animal Husbandry (now Animal Science).

Student life was never dull either. Fraternities (Beta Sigma and Upsilon Sigma Phi) and sororities (Sigma Beta and Sigma Delta) compete for excellence in cultural presentations at Baker Hall. Among the Broadway stage shows, wherein they acted like professionals were South Pacific, West Side Story, A Streetcar Named Desire, The King and I and many others.

The most popular radio show involving students (TV broadcasts and TV sets were rare in homes) was the Student Canteen held from 12 noon to 1:30 pm and hosted by Leila Benitez, called the Lady Dean of Student Canteen and Eddie Elarde. They were idols of students in speaking of English, which was a natural conversation medium (meaning, there was no guilt feelings of not using Tagalog, unlike today) because not all students who came from all over the Philippines were not native speakers of Tagalog but were comfortable in English as it was the medium of instruction from the elementary to high school) among students and in all classes. As such, they could speak and write well in English. The Student Canteen show format is a basically a student singing talent contest. The contestant had to show a school ID (the Recto Avenue fakirs were unheard of during those days) to qualify in the contest. Some contest format included, sing-alike with a popular artist (like Elvis Presley, Perry Como, the Platters, the Brothers Four, the Bee Gees, Jimmy Rodgers, etc.) or a popular tune like yodeling (originated from Switzerland) with holding the last note as long as one can (examples of yodel songs are Du, Du, Du (You, You, You are my True Love and Pitong Gatang by Fred Panopio,) or a cowboy song.

There are a few however, who came from rich landed families particularly the sugarcane hacienderos. They were sent by their parents with a view to becoming managers of their farms.

The average land ownership of small farmers during that period was about 3 ha and was sufficient to make a decent living since the cost of living was low and everything was cheap.

Significant events, late 1950s

1. Total solar eclipse of 1955 seemed to welcome Freshmen Batch '55. The longest solar total eclipse in the 20th century happened in Los Baños (about the centerline of a 254-km wide West-East path) and elsewhere in Southeast Asia on June 20, 1955, a week after opening of classes. As the moon gradually shaded the UPCA campus, there was increasing anxiety from eerie to scary by the noon class dismissal. At lunch time, there was complete darkness; strong winds blew because of sudden drop in temperature and cocks began to roost in trees then crowed as "dawn," which occurred a few minutes after 12 noon. The total darkness lasted 7 minutes and 8 seconds. The longest possible duration of a total eclipse is 7 min 32 s. The next long-duration total solar eclipse in the Philippines will be on July 16, 2186 with duration of 7 min 29 s, according to NASA.

2. The death of President Ramon F. Magsaysay. "The Mount Pinatubo" C-47 plane carrying the president crashed in the early hours of March 17, 1957 at Mount Manunggal in Cebu. His campaign to develop agriculture among high school student graduates of 1955 was instrumental in the influx of students enrolled in UPCA in 1955, the highest enrollment ever. He distinguished himself as the "Idol of the Masses, queller of the Huk Rebellion through his military strategy as Secretary of National Defense, "Find 'em, Fight 'em and "Finish 'em", resettler of rebel returnees and the landless farmers to Palawan and Mindanao, which he called as "The Land of Promise" and implemented his "Artesian Well Program," which provided the inhabitants of the remote rural areas access to potable water.

3. The UPCA Golden Jubilee celebration and the 10th World Boy Scouts Jamboree seemed to send off Graduating Class'59. UPCA was the site of an event held every four years like the World Olympics, the "first World Scout Jamboree in the Far East" and was dubbed as "The Bamboo Jamboree" because bamboo and nipa were used in temporary structures. There were 12,203 scout delegates from 44 countries and the theme was "Building Tomorrow Today."

   People and activities could be seen from the Farm Machinery building portal in Pili Drive where surveying transits were stationed. Mathematics, physics and statistics classes, which were held at the agricultural engineering building (Figure 6), were distracted by streams of people walking to the jamboree site and sometimes stopping to rest at the portal. The buzz word was "swapping" of scout patches among delegates and visitors. The vacant area now occupied by the Umali (Los Baños Subdivision) was converted into a *feria,* which gave concern to the pioneer residents of the subdivision about crime and noise.

   As a result perhaps of hosting the rare international event combined with its being economically advanced in Asia and existence of an excellent agricultural institution, the Philippines became hosts to international institutions like the International Rice Research Institute, the Asian Development Bank and SEARCA. It had been the preferred host for the UN Economic and Social Commission for Asia and the Pacific (UN ESCAP) but for some reason like lack of funds or perhaps because of the shortsightedness of the Filipino leadership, the offer was rejected. Eventually, Thailand, which was significantly poorer than the Philippines then, hosted the site in Bangkok and spurred the locating of the Regional Office of the UN Food and Agriculture Organization (FAO). Perhaps the anti-foreign attitude brought about by colonial mentality has prevailed in the Filipino psyche. A golden opportunity was missed. This was to be repeated in 1991 when the hosting of the Regional Network for Agricultural Machinery (RNAM) which became a UN Agency like ESCAP became UNAPCAEM and picked up by China. Moral lesson: leaders make or break the country.

Faculty years, 1959 to 2004

After graduating in 1959, I decided to join the Department of Agricultural Engineering faculty after agonizing first on whether I would take the alternative employment opportunity in the STANVAC (Standard Vacuum Oil Company) which became Filoil, then Esso Philippines and currently Petron that provided me undergraduate scholarship. Paying back the company in terms of rendering service after graduation was not required by the grant. The motivating factor for the choice was the prospect of academic advancement and tenure in government service.

Lacking teaching experience and training in the art of teaching and as a neophyte engineering faculty, I tried to develop communication skills, an important trait for a teacher. I tried to emulate inspiring and effective teachers in the past and banked on my own classroom learning experiences recalling teachers whose techniques best motivated me to learn. One such engineering professor was **Prof. Alejandro Catambay**, the department head who was well prepared and delivered the lecture extemporaneously and without looking at notes yet explained the topics clearly and interestingly by just using the chalkboard. One of the gauges of an inspiring teacher was a desire to look forward to listen to his next lecture and to go to the library to read more about the basic principles he had explained. My gauge of an effective teacher was my being confident of having learned something at the end of the lecture in contrast with just mechanically taking notes to be reviewed and learned from later.

My classmates who were also hired as faculty in other departments also felt the same way as I did. Our Class '59 batch of new instructors in UPCA organized a series of seminars entitled, "Teachers teaching teachers teaching," a catchy yet meaningful and creative play with words coined by Classmate **Godehardo Calleja** who had been chief editor of the Aggie Green and Gold, then the Student Body Organization organ. Classmate **Gody** was sort of a maverick writer because later in his career,

he wrote a PhD thesis in a controversial presentation style (included poetry and off-the-beaten-track format) in a US university. He successfully defended it however, up to the Board of Regents versus his advisers, arguing that the scientific content was sound and indeed presented a new discovery. Thus, according to him, creative writing and reporting need not follow the straight -jacket format designed for systematic thinking people. But creative people like paint artists and inventors think differently and develop their own means to fulfill their creation making them seem weird.

At UPCA, the systematic straightjacket system rules in thesis writing stemmed from **Dr. Sam Trelease** who set the manual for technical and scientific presentation during the 1930s. That manual, which is still used today by students writing their thesis, arose for the convenience of the English editor but had somehow, restricted creative thinking and writing, if the Calleja anecdote were to be a basis.

With the assistance of our senior colleagues, like Instructors Bert Bautista and Caloy del Rosario, classmate Max Villanueva and I struggled in preparing laboratory exercises and examinations in agricultural machinery for agriculture students (during the initial semester, some of them were our batchmates), going through the pains of typing on Gestetner stencil sheet and mimeographing, collating and stapling the pages through the night at the Farm Machinery building offices. The scanty resources, which were a far cry from today's modern electronic facilities, triggered our creative instincts to do what we thought was best for the students of the time.

Teaching function is the primary reason for being appointed to the faculty. Yet, an instructor at the UP system has to excel in doing research as shown by publication of scientific paper in a peer-reviewed journal. During the early 1960s, a new engineering faculty usually felt strangeness and inadequacy in this requirement because traditionally, the engineering faculty has not been as attuned to the research culture as the agriculture faculty. The Department of Agricultural Engineering was essentially a service department to teach the basic courses in mathematics, physics and statistics to agriculture and forestry students. New instructors came from UPD Colleges of Engineering and Liberal Arts. The new recruits with BSA major in agricultural engineering and the BSST also pitched in the teaching of these basic courses. The high turnover of faculty in agricultural engineering, lack of exposure to research and intent of establishing a career track or settle in Los Baños as well outside job demand were some of the reasons for not doing research.

After the establishment of CEAT, the faculty profile changed. Most faculty members were recruited among the top graduates of CEAT, but there was vulnerability of "in-breeding." Being in the engineering proper, the faculty became aware of the need to do research. Still the faculty of the Department of Engineering Science, which is essentially a service department of CEAT has a high faculty turnover, which somehow, became mandatory because of the "publish or perish" policy of the university system. The age-old system of tapping the senior faculty from other departments of CEAT would obviate such high turnover because of a research project assignment. The senior faculty with research experience would now make the department research-oriented.

Faculty development efforts were not only through graduate studies. Senior Instructor **Dante de Padua** realized the lack of exposure of the young faculty to the rural areas, the supposed playing field of agricultural engineers. In Summer 1960, one of the memorable learning experiences by the neophyte faculty that included **Roberto C. Bautista, Abraham B. Caoili** (†), **Carlos R. del Rosario, Jose R. Arboleda (†)** and **Reynaldo M. Lantin** was the "baptism of fire" through a torturous but educational trip to the Luzon countryside. The trip was organized by Instructor **Dante B. de Padua** (Sir Dante), then a senior faculty at the Department of Agricultural Engineering, and encouraged by **Prof. Alejandro Catambay**, the department head. **Fernando Pintor (†)**,The department secretary, very efficiently handled the logistics during the trip.

The purpose of the travel was familiarization of the conditions in the countryside to widen the horizon of awareness as a teacher in agricultural engineering should. During that time, paved roads going north from Manila generally ended after Valenzuela, Bulacan. Paving would have been uneconomical as they would be damaged only by heavily loaded trucks as logging then was a lucrative and seemingly endless plunder of still large forest resources. The first leg of the grueling trip, which started from College at three o'clock in the morning to Santiago, Isabela, took 21 hours. At some points through the forest, the road was blocked by felled trees or branches and forced the group to detour or manually get them out of the way amidst the anxiety that the situation might be an ambush by bandits. A small transistor radio (a new technology at the time) provided music and news of the weather and current events.

Along the route, the group stopped to interview farmers with the help of Ilocano/Pangasinan interpreters in the group; otherwise, English was used. The journey along the lonely, rough and dusty roads was made a little bit pleasant and sporty by simulating a safari. Using air rifle, **Sir Dante** shot pigeons (batu-bato), which happened to be on the roadway. Subscribing to the principle of being wildlife-friendly (still unheard of during those days) or rather being a true-blooded sportsman, he would shoot birds only while they were flying and the vehicle we were riding was moving, thus giving them a fighting chance and the rifleman the thrill of hunting. Also, he should shoot the bird either to kill or miss it but not to wound it. It

was the excitement, not the catch that mattered. At any rate, no one could remember having feasted on any of that tasty bird during the trip. Perhaps the kill was not retrieved from the thickets as we did not have a hunting dog.

In Isabela, the group noted the contrast between the upper brown rain-fed rice lands and the lower verdant irrigated rice lands demonstrating the need for the development of extensive irrigation systems to boost rice production. The group also noticed the empty and idle huge grain elevators branded as Butler bins. One such "white elephant" was located at Calamaniugan at the northern tip of Cagayan. These huge cylindrical storage structures, which are common in the US cereal farms, were funded through the ECA-NEC (Economic Council Administration-National Economic Council), forerunner of USAID to contain the expected large harvests of palay and corn in Central and Northern Luzon. The bins were either empty because such surplus of grains never materialized due to the undeveloped agriculture or contained spoiled grains because of technical and operational problems related to humid environment and lack of training of technicians, according to **Sir Dante**. As such, the bins became symbolic monuments of failure and were eventually either cannibalized illegally or torn down legally and disposed of as junk or shipped back to the US.

The group rounded the northern tip of Luzon by first crossing the Cagayan River using the locally improvised "Row-row" raft service. The group ferried themselves and the reliable Jeep by manually turning the capstan with a rope tied to anchors at the opposite river banks. The bridge built across the river several years hence had rendered the ferry system obsolete.

The next leg of the journey through the tortuous gravel roads on mountain sides was exciting and elicited silence (perhaps in prayer) as College Driver **Peter Otero** who was assigned to the group by the UPCA Service Division (then under the Department of Agricultural Engineering), by virtue of his being veteran driver in the route but although having only three fingers in one hand was an expert driver, probably scared the group while negotiating the hazardous road curves. Driver **Peter** emphasized the need to speed up in anticipation of avoiding a foggy section in the higher elevations by passing it by 4 o'clock in the afternoon. At one point however, the group had to wait two hours for the signal to proceed through the single lane and dangerous road section. Sir Dante, either cheered or scared the group even more by mentioning the song, "Nearer my God to Thee" while the vehicle was negotiating in Claveria, Cagayan, a precipitous road overlooking the blue South China Sea that appeared some hundreds of meters below.

The next day the group stopped at a rice hacienda in Pangasinan. It was owned by Mr. Luis Lichauco, a jolly and witty retired small-plane pilot. After briefing the group on his partially mechanized rice farms (tractors and carabaos were used), he gave safety tips which centered on the word, "anticipation," whether in driving a vehicle, piloting an airplane or in any other activity like playing tennis.

Research output in engineering unlike in agriculture had been low because undergraduate engineering education in most colleges including that in UPD did not normally provide for exposure to research beyond doing some laboratory work as part of a course. The dark-groping new engineering faculty would be exposed to the tools and would acquire experience in independent scientific research only when he/she pursued a master's degree in agricultural engineering. For one whose training and education had comprised mostly of analyzing problems, finding solutions by developing formulas and manipulating them will have to adjust to writing for effective communication as in the format of a scientific paper. Thus, a neophyte engineering instructor had to aim for getting a master's degree to enable him/her to climb the academic promotion ladder.

The farm machinery laboratory inherited several units of cut-away stationary engines showing the internal parts and how they functioned. The shells of the engine blocks outer were neatly sawed manually by Lab Technician **Ponciano Catuira (†)** to reveal the internal parts. Unfortunately, the rare collection of teaching aids was disposed of. Working models of engines took their place in the laboratory. It would have been symbolic and significant if the AMTEC-tested 10-hp diesel engine prototype which was made in the Philippines by a local company with technical backstopping from a Japanese vehicle company were also displayed in the laboratory.

Four-wheeled tractors used for tractor driving lessons included the following makes and models Ford Dexta, International Harvester MD, Farmall Cub and Farmall. The Farmall and the MD were three-wheeled tractors. The MD diesel engine had a small auxiliary kerosene engine for starting and the operator manipulated two levers to start-drive the main diesel engine and switch the fuel supply at the same time. To do that required skill and timing. The Farmall Cub was a four-wheeled tractor with 10-hp gasoline engine and could run at a speed of 30 km/h. Like the cut-away engines, the tractors were later condemned through the Property Office.

The cut-away John Deere tractor, procured by Instructor **Roberto Bautista** in 1958 while on a return trip from MS study at Cornell University, is still functional.

Suggestions for the new era (next 100 years) of CEAT

1. CEAT to reinvent agricultural engineering. Former UPCA Dean Dioscoro Umali once remarked that the agricultural engineer was neither an engineer nor an agriculturist. CEAT can make it both - a unique engineer and a unique agriculturist. CEAT agricultural engineering education may excel even more than its present status for its graduates by exploiting its uniqueness and comparative advantage over agriculturists on the one hand and over non-biological engineering professionals (those dealing only with inanimate engineering materials) on the other hand for the benefit of humankind. This calls for a balancing act. By the way, agricultural engineering departments or institutes in most US universities and others around the world have been renamed to include the words, "biological" or "bio-engineering."

2. CEAT to create new departments for mechanical engineering, mining and metallurgical engineering and landscape architecture engineering to fully pursue the objectives of CEAT in developing engineering professional, scientific research and technological manpower for agro-industrial development.

3. CEAT to provide inputs in government policy and strategy formulations. An example of a long-standing policy that may need paradigm change or reversal is that of agriculture being the provider of rural jobs in spite of historical evidence and track record since 1946, that the policy has not been effective and on the contrary brought only poverty to the poor employer (poor farmer-producer or small land holder) and to the poor employee (the poor farm laborer). No country in Asia has progressed by staying purely agrarian. Former President Elpidio Quirino had propelled the Philippines to being an economic tiger albeit briefly because of his policy of industrialization. Unfortunately, the policy was not sustained during the succeeding years after his term because of strong lobby and perhaps also of the traditional politician mentality (looking after being elected or reelected).

4. CEAT to collaborate with government agencies, LGUs and NGOs to real-life problem solving. Activities along this collaboration can be closely supervised on-the–job training and can be exciting for students since they contribute to the solution of say flooding problems. CEAT faculty may motivate students by awakening their dormant creative ideas and providing them opportunities to solve problems in collaboration with government agencies and NGOs which will modify approve and implement the designs. After graduation they can follow up their designs and feasibility studies in agro-industries.

5. CEAT to establish a center for engineering agro-industrial technology research to address the technology needs of industrialization particularly promoting public-private partnerships. It is also an outreach arm of UPLB/CEAT in solving engineering problems locally and nationally. For example, DPWH may arrange with CEAT the solution to the traffic problem in College Crossing during peak hours possibly by designs of structures like overpass or other traffic management means. It may also do feasibility studies of having freight transport by railway for products from Northern and Southern and Luzon to MM and from the production areas of Mindanao and Visayan islands to the nearest RoRo ports.

6. The CEAT faculty, students and staff to actively participate in the UPLB *Pahinungod* or Volunteerism Program. One such project is the typhoon tracking and rainfall intensity/duration monitoring and reporting in real time using cellphones.

7. UPLB to encourage enrollment in the agriculture and forestry -related courses at UPLB by selective admission using high school average grade of 85 and above percentage points instead of UPCAT. First applied for admitting the freshmen Batch '56 who graduated in 1960, this selective admission system has proven to be effective if the number of graduates and achievers among them is the gauge. The percentage of graduates from the freshmen entrants increased from about 26% for Batch '55 to about 40% for Batch '56.

8. A parallel trend is the emerging interest in sustainable farming and reforestation by patriotic retired or near-retired professionals in non-agriculture fields. Their products and agricultural outputs complement the total agricultural production in food and fiber of the country. These moneyed groups of people who usually opt to live in the farm for retirement have the capacity to practice modern agriculture if given opportunities to study agriculture like offering special or continuing education courses for them.

9. UPLB to institutionalize a continuing faculty development program. As in the past, UPLB was founded on a strong faculty and that strength has been sustained by continuous faculty development through fellowship programs in contract with Cornell University from 1952 to 1978. Similar contract programs may be developed through local and international funding with the best universities around the world. The faculty of UPLB in the future may consist of Filipino graduate alumni of top universities as well as visiting foreign professors and students from around the world making UPLB a cosmopolitan Campus. CEAT may start such a program.

10. UPLB to establish a center for teaching and learning excellence while scrapping the student evaluation of teachers as a criterion for promotion. There is always room for improvement, dubbed as the biggest room in the world. Instructors on their own initiative may engage in self-improvement activities such as pubic speaking, learning new techniques in teaching (e.g. twinning, a technique developed and practiced at the Iowa State University College of Engineering) and creative thinking. Using student evaluation as criterion for promotion is prone to corruption of both teacher and student. Teaching improvement tracks the "daang matuwid."

11. CEAT faculty may engage in instruction assessment activities to achieve teaching excellence. For example, the University of Hawaii has a Center for Teaching Excellence (CTE) which provides consultant services for helping the participating faculty (scheduling a session with a CTE consultant) through classroom observation, small group instructional diagnosis, videotape assessment, and paper and pencil assessment.

For UPLB, the consultant may as well be a peer awardee for best teacher. ■

HISTORY OF THE UPLB-CEAT CHEMICAL ENGINEERING DEPARTMENT

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The roots of the UPLB-CEAT Chemical Engineering Department may be traced to the UP College of Agriculture (UPCA) Sugar Technology Program (STP), which was reinstituted in 1968, even before UP Los Baños became an autonomous campus of the University of the Philippines System (**Figure 1**).

Way back in 1920, the Philippine sugar industry was young and expanding. It had a critical need for people with expertise in Sugar Technology- a graduate with integrated knowledge in cane production, sugar chemistry and sugar factory operations. The UPCA responded by training students in the operation of a college sugar mill, then under **Dr. Manuel L. Roxas** (namesake of a former Philippine president), chair of the Department of Agricultural Chemistry. To formalize this training, a certificate in sugar technology was conferred on students majoring in Agricultural Chemistry who put in an extra "fifth year work in Sugar Technology courses". It has been said that graduates of this curriculum were readily taken in by the sugar centrals, who in a short period, were given higher ranks and very responsible positions. Then a 5-year BS Sugar Technology (BSST) curriculum was formally instituted in 1925. Starting in this period, Sugar Technology students earned praises and, gained highly respected stature in the academe. The last graduates of the pre-World War II curriculum obtained their degrees in 1942. In Sugar Technology history, this batch was dubbed as the *first wave* graduates.

With the initiative of the Philippine Sugar Institute (PHILSUGIN), a research and development arm of the sugar industry (created in the 50's), the offering of the BS Sugar Technology was resumed in 1955. The first post-war Sugar Technology curriculum was a 5-year, one-summer course with no thesis. It was classified into two types: Type A for Sugar Engineering majors; Type B for Sugar Chemistry majors. In both types, students are required to practice in a sugar factory for one whole milling season (about 6 months).

As history unfolded, shortly before World War II, the Chemical Engineering and Chemistry laws were passed by the Philippine Congress, authorizing only registered Chemical Engineers to run chemical factories, which included sugar mills, and only registered Chemists as eligible to work in the chemical laboratories, including the sugar control laboratories. These positions were previously occupied by the Sugar Technology graduates. During the period 1959-1967, the Chemists and Chemical Engineers could take their professional examinations, and therefore were eligible to work in chemical factories. In the absence of a professional licensing examination, Sugar Technology graduates found themselves, either unemployed or underemployed in sugar factories because of such legality. Hence, the post WWII Sugar Technology graduates (1955-1965), *the second wave* graduates, were legally barred from practicing their profession in sugar centrals. The Sugar Technology Professionalization Law had to be enacted, but as expected, found some "resistance" from competing disciplines who lobbied against passage of such law. Because of this situation, the BSST curricular program was discontinued, instead a 5-year BS Agricultural Chemistry curriculum was adopted with an option to major in Sugar Technology.

In 1968, Republic Act No. 5197, regulating the practice of Sugar Technology, was enacted into law, through the concerted efforts of the alumni working in the sugar industry, and through the legwork of a Sugar Technologist **Prof. Amando E. Libunao**. The first Sugar technology Board examination was given in August 1973. Those graduates who passed the board examination can legally practice their profession, just like the Chemists and the Chemical Engineers working in sugar factories. On July 3, 1968, PHILSUGIN appropriated an initial grant of PhP 75,000 to UPCA to support the program reinstituting the BSST curriculum. This grant increased and continued, from 1968-1989, even when PHILSUGIN was closed to give way to the creation of a very powerful Philippine Sugar Commission (PHILSUCOM), 1973-1986, which later was also dismantled after EDSA 1, in order to establish the Sugar Regulatory Administration (SRA) in 1986. The ST graduating class during this period was composed of the *third wave* graduates.

ChE as part of the UPLB Expansion

The UPLB campus gained its autonomy on November 20, 1972. From then on, it has expanded its horizon in its attempt to chart new directions. In its goal to continue serving the country as its principal institutional resource of food, agriculture and environment, it has started developing complementary strengths in the physical science (Engineering, Mathematics, Statistics, Computer Science), social sciences and in the humanities. In the 80's, **Dr. Emil Q. Javier**, former UPLB Chancellor, who later became UP President, envisioned an engineering university. This was in recognition of the major role of engineers in improving the Philippine economy. Through his leadership, the Sugar Technology Program (STP), then a joint program of CA and CAS, was merged with INSAET to form the College of Engineering and Agro-Industrial Technology (CEAT) in 1983.

Harnessing all the STP resources, the Chemical Engineering Department was created, with the following rationale: *"to produce the needed Chemical Engineers with understanding of bioprocesses, to scale-up production from laboratory to bench levels into the industrial level. With the availability of trained manpower, local processing of raw materials (for which the Philippines is noted for) into consumer and industrial products, would, eventually, help raise rural income, generate foreign exchange, and hopefully, protect the Philippines from adverse external trade conditions".* With such lofty ideals, all the STP resources (faculty, support staff, facilities, building and financial resources from the sugar industry) were used to start up the academic activities of the newly created department. Later on, additional maintenance and operating funds granted by the National Science and Technology, through the initiative of **Dr. Emil Q. Javier**, also helped ease the "growth pains" of a young department. Technical cooperation assistance from the DOST-Japan Society for the Promotion of Science (JSPS) through its exchange scientist program, 1988-1999, contributed significantly to the faculty development.

Chemical Engineering (ChE) Department Buildings

The CA-CAS STP occupied a portion of the Old Chemistry building and the old PHILSUGIN building until 1988. Then the UPLB administration financed the establishment of the first ChE building (across the PHTRC) along

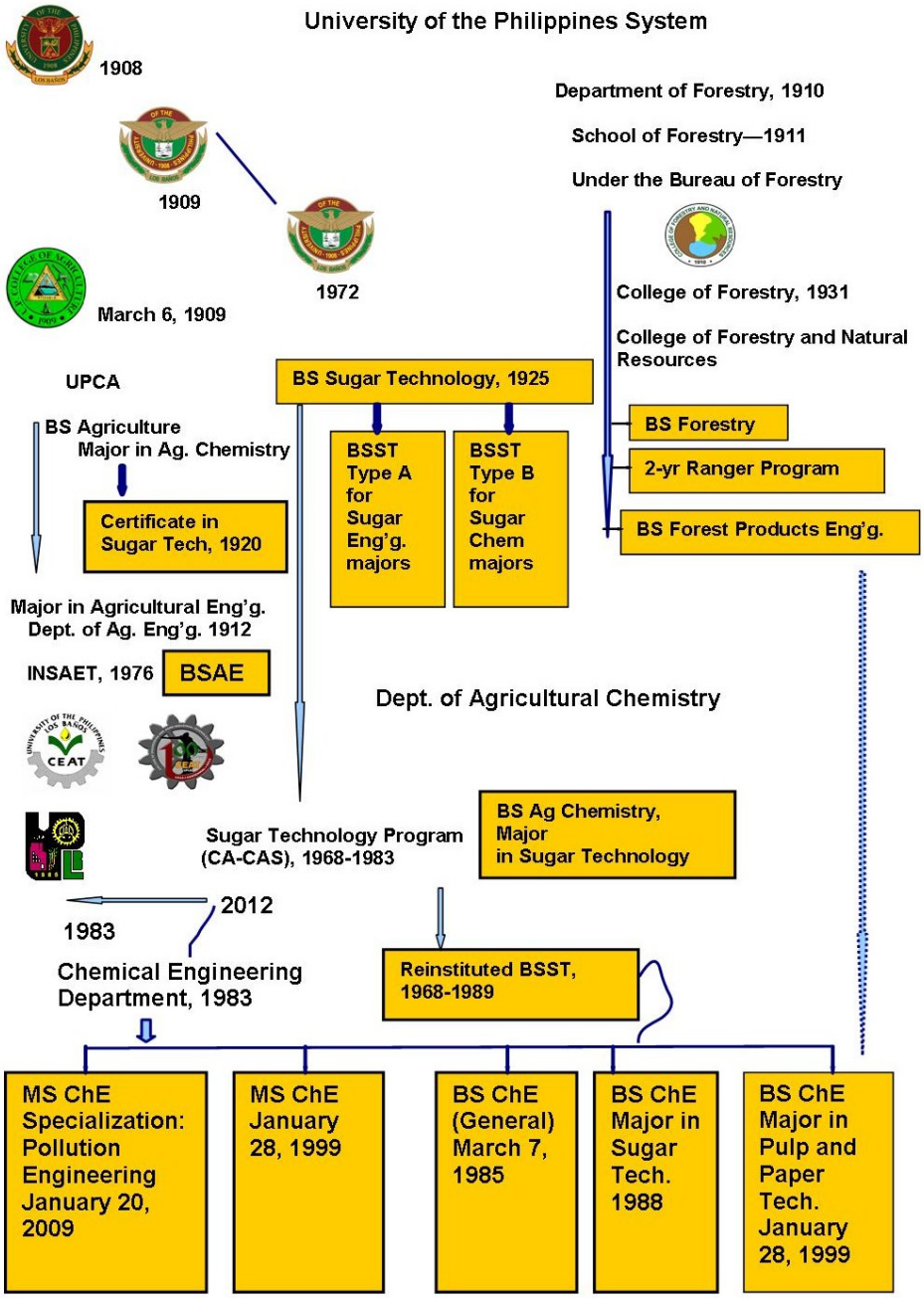

Figure 1. The Chemical Engineering Department, CEAT-UPLB.

the Lanzones road, in exchange of the old PHILSUGIN building which was given to SESAM, plus a portion of the old Chemistry building, then given to BIOTECH. Shortly after the ChE-ST constituents transferred to its new building beside the CEAT building, the entire old Chemistry building was destroyed by fire which originated from one of the BIOTECH laboratories . The second building was built through the funds allocated by **Dr. Victor S. Luis, Jr.**, then Acting Vice-Chancellor for Planning and Development in the 90's. The third building was constructed through the fund given by former Chancellor **Wilfredo P. David**.

BS ChE curriculum

Meanwhile, CEAT dean, **Dr. Reynaldo M. Lantin** and the first department chair, **Dr. Ernesto P. Lozada** spearheaded the Chemical Engineering curricular development through its faculty composed of **Dr. Casiano S. Abrigo, Jr.** (second department chair and Director, Sugar Technology Program), **Dr. Jovita D. Layoso-Movillon, Dr. Pham Binh Chay** (affiliate faculty from BIOTECH), then instructors **Mariano B.Olea** and **Rex B. Demafelis**. The institution of the BSChE curriculum (with general option) was approved by the UP Board of Regents on March 7, 1985.

This curricular development coincided with the critical stage in the sugar industry, both local and worldwide, brought about by the very low prices of sugar in the world market, and worsened by the Philippines' loss of its preferential US sugar market because of the eventual termination of the Laurel-Langley Agreement and the various US Sugar Acts. Such unfavorable economic conditions in the sugar industry had its equally adverse effect on the ST enrollment. Therefore, despite the opposition and disappointment of the ST alumni who were working in the sugar industry, the BSST curriculum was phased out effective AY 1989-1990. In its place is the option for a major in Sugar Technology, initially offered in AY 1988-1989. The two options have the same courses in terms of general education, legislated course (PI 100) and technical core courses (ChE, ENSC, MATH, PHYS, etc.). They only differ in the cognate/elective and major courses.

Since then strengthening and revitalization of ChE curricular offerings were initiated and implemented under the strong leadership of then department chair, **Prof. Rex B. Demafelis** and curriculum committee chair, **Dr. Jovita L. Movillon**.

At present, the department offers three options to its undergraduate students: BS ChE (general), major in Sugar Technology, and the major in Pulp and Paper Technology (approved by UPLB Boards of Regents on Jan. 28, 1999)- a joint program with the College of Forestry and Natural Resources (CFNR). CFNR phased out its BS Forest Products Engineering curriculum thereafter. The department also offers the M.S. in Chemical Engineering (also approved on Jan. 28, 1999), and the MS in ChE, with Specialization in Pollution Engineering (approved on Jan. 20, 2009), which generally aim to provide chemical engineers a greater opportunity for improving or developing further their capabilities in providing quality instruction and in undertaking research and development projects.

ChE Department Chairs

Since its institution, the department has been very well supported by all UPLB Chancellors and CEAT Deans, even under the different department chairs, namely, **Dr. Ernesto P. Lozada, Dr. Casiano S. Abrigo, Jr., Dr. Reynaldo I. Acda, Prof. Rex B. Demafelis (three terms), Prof. Myra G. Borines, Dr. Jovita L. Movillon, Dr. Catalino G. Alfafara** and **Dr. Manolito E. Bambase**.

Some Academic Linkages and collaborations

Through the years, STP and the department have collaborated with other CEAT and UPLB units through the affiliate faculty members coming from IAE, BIOTECH, CFNR, IC-CAS, IBS-CAS, IFST-CA, who serve as co-advisers and panel members of thesis students. There are also linkages with different sugar factories for the practicum of its students, like the Central Azucarera de Don Pedro, Inc. (CADPI) in Nasugbu Batangas, Batangas Sugar Central in Balayan, Batangas, Victorias Milling Company (VICMICO) and Lopez Sugar Central in Negros Occ., and Bukidnon Sugar Milling Co. (BUSCO) in Bukidnon.

PIChE Laguna

Through the encouragement of **Dr. Ernesto P. Lozada, Asst. Prof. Rex B. Demafelis** and **Asst. Prof. Marilou N. Nabatilan** worked for the formal organization of the Philippine Institute of Chemical Engineers (PIChE) Laguna Chapter in September 1997. During that period, the department served as PIChE Laguna secretariat. Then **Asst. Prof. Demafelis** became the vice-president and chair of the committee on education. Through the department faculty and staff, PIChE-Laguna sponsored and Organized various technical seminars for the continuing education of chemical engineers in the CALABARZON. Also during this period, PIChE-Laguna, through the department, started conducting review sessions for prospective examinees of the Chemical Engineering Licensure Examination.

References:

CA-CAS Sugar Technology Program Annual Reports, 1973-1985; and based on the recollections of Sugar Technologists/Professors: ***Sugar T echnologist Delfin J. Suerte (†), Engr. Leoncio Cifra (†), Sugar Technologist Federico G. Isaac (†), Sugar Technologist Amando E. Libunao (†), Dr. Ramon L. Samaniego (†); Dr. Ruben G. Camurungan; Dr. Casiano A. Abrigo, Jr. and Dr. Jovital Layoso-Movillon***

THE CIVIL ENGINEERING DEPARTMENT: THEN AND NOW

Marish S. Madlangbayan, PhD
Assistant Professor and Chair
Civil Engineering Department, CEAT, UPLB

Civil Engineering is one of the five engineering degree programs offered in the College of Engineering & Agro-Industrial Technology in the University of the Philippines Los Baños. The 5-year B.S. Civil Engineering curricular program was proposed in 1991 and was first offered in June 1992. **Dr. Danielito T. Franco** was appointed as the first program leader. He was followed by **Dr. Victor S. Luis, Sr.** in 1994. On the same year, new faculty members started to come in. They were **Engrs. Purificacion A. Orno, Marloe B. Sundo, Jennifer R. Bacud**, and **Vicente D. Pastor.** In 1995, **Dr. Senen M. Miranda** was appointed as the first department chair. **Ms. Sophia Merin** was the sole administrative staff. These members and staff became the second guardians of the first batches of proud CE students whose "ancient" pictures were retrieved and are shown below.

UPLB CE Students are shown here on its 1st Hydrographic Survey in 1995 (Front row: Dr. Zafra, second from left ; Asst. Prof. Sundo, 4th from the right; Back row: Dr. Ma Madlangbayan, 1st from right)

Back in 1995, there was difficulty in hiring qualified civil engineers to become faculty members. The department then relied on lecturers who were working in various government and non-government agencies located in Los Baños to augment its teaching staff. These lecturers consisted of **Dr. Joaquin O. Siopongco (deceased)**, retired Deputy Director of FPRDI, **Dr. Florence P. Soriano**, the then Director of FPRDI, and**Engr. Gil N. Cuenca**, then connected to a subdivision development company but now an engineer at the Laguna Water District. In 1996, more members came in as **Engr. Ruben D. Tanqueco** of UPLB-PPMSO and **Engr. Gregorio S. Pascual** of UPLB-CPDO were hired as lecturers.

Ms. Jovita M. Saquing, Dr. Senen Miranda, Prof. Victor B. Ella with a Visiting Japanese Professor

Back in 1995, there was difficulty in hiring qualified civil engineers to become faculty members. The department then relied on lecturers who were working in various government and non-government agencies located in Los Baños to augment its teaching staff. These lecturers consisted of **Dr. Joaquin O. Siopongco (+)**, retired Deputy Director of FPRDI, **Dr. Florence P. Soriano**, the then Director of FPRDI, and **Engr. Gil N. Cuenca**, then connected to a subdivision development company but

CE students of the freshman batch 1992 and 1993 (courtesy of Mr. Gerald Cortez)

In 1998, **Engr. Ferdinand F. Bengusta**, a CE board exam topnotcher, became the second graduate of the department to be hired. **Dr. William T. Tanzo**, an earthquake engineering product of Saitama University, joined the staff in 1999 as a balik-scientist. The hiring of the best graduates of the department was continued the same year. **Engr. Carlo F. Moya**, a cum laude graduate, was hired in 1999, followed by **Engr. Mylene M. Palaypayon**, another cum laude graduate, and **Engr. Ramil G. Mijares**, a magna cum laude graduate, in 2001, **Engr. Allan Karlo S. Abrogena** and **Engr. Michael Ryan R. Barile**, in 2002. After **Dr. Senen M. Miranda** retired in

Dr. William T. Tanzo (right) having lunch with the department faculty and friends.

2002, **Asst. Prof. Jennifer R. Bacud** was appointed as chair of the department.

There were several changes in the faculty profile since the retirement of **Dr. Miranda**. In 2003, **Engr. Angeli D. Cabaltica,** a 2002 UPLB graduate, and **Engr. Richelle M. Gallardo**, already an M.S. holder, in 2004. **Engr. Carlo Arturo SJ Mondonedo**, a *cum laude* and M.S. holder from UP Diliman joined in 2004. The following year, **Ms. Eva May V. Matammu**, another UPLB graduate but coming from an engineering consultancy firm, was hired. In 2004, the headship of the department was designated to **Asst. Prof. Marloe B. Sundo.** Not long afterwards, on the same year, **Dr. William T. Tanzo** became the department chairman.

From left: Dr. Miranda, Engr. Palaypayon-Ana, Ms. Merin, Engr. Bacud and Engr. Pintor

From left: Engr. Yago, Asst. Profs. Palaypayon-Ana, Sundo, Ms. Merin, Engr. Maranan, Asst. Prof. Gallardo -Zafra, Engr. Pascua, and Asst. Prof. Cabaltica

The gentlemen from left: Asst. Prof. Sundo, Engrs. Estil, Narciso and Sadia and Dr. Madlangbayan. The ladies from left: Asst. Prof. Cabaltica, Ms. Merin and Engr. Tirazona

In 2005, the department head was **Asst. Prof. Marish S. Madlangbayan.** Later on the same year, **Asst. Prof. Ferdinand F. Bengusta** became head. During these times, there were several changes in the faculty lineup of the department. These changes came about in order to accelerate the faculty development of the department. As several faculty members had to leave and pursue masters and even doctorate degrees, the vacant faculty slots were filled-in by new members. **Engr. Allan C. Manalo**, employed at FPRDI, was tapped as lecturer in 2005. **Engr. Perlie A. Panopio** and **Engr. Ginghis B. Maranan**, both cum laude graduates, were recruited in the early months of 2006 while **Engr. Charrytee P. Pascua** and **Engr. Erwin M. Yago** were hired in December 2006.

From left: Engrs. Mijares, Matammu, Panopio, Ms. Merin, Asst. Profs. Palaypayon and Bengusta

In 2006, the department headship was passed back to **Asst. Prof. Marloe B. Sundo**. Several new faculty members were hired during his term. **Engr. Dan Michael A. Sadia** together with **Engr. Jenyl R. Estil** (UPLB, cum laude) were hired in 2008. **Engr. Paul John Ross L. Narciso** and **Engr. Sunseehray Alessandra B. Tirazona**, both UPLB cum laude graduates, were hired in 2009. On the same year, **Dr. Marish S. Madlangbayan** returned back to duty from his doctoral study at Tokyo Institute of Technology. In November of the same year, **Dr. Eliseo V. Ana**, a summa cum laude doctoral graduate at Brussels University in Belgium, was hired.

In 2010 the chair of the department was designated to **Dr. Marish S, Madlangbayan.** During From this year, several faculty members returned to the department after earning their graduate degrees. In 2010, **Asst. Prof. Ginghis Maranan** returned to the department after obtaining his Masters Degree from Tokyo University. In 2011, **Asst. Prof. Perlie Velasco and Dr. Richelle G. Zafra** returned to the department after obtaining their Masters and Doctorate Degrees respectively. Later on the same year, **Asst. Prof. Kimberly T. Solon** was hired. The picture below shows the current faculty members of the CE department.

The gentlemen from left: Asst. Prof. Maranan, Dr. Madlangbayan, Engr. Sadia and Dr. Ana Jr. The ladies from left: Dr. Zafra, Ms. Merin, Engr. Tirazona and Asst. Prof. Solon

REMINISCING THE EARLY YEARS OF THE ELECTRICAL ENGINEERIONG DEPARTMENT

Roderick L. Catriz
Assistant Professor and Chair
Electrical Engineering Department, CEAT, UPLB

It has been my privilege to see and experience first-hand the evolution and transformation of the Department of Electrical Engineering. We officially started on September 26, 1996 when the board of regents approved of institutionalizing the new degree program. **Prof. Maximino G. Villanueva**, our first department chairman and one of the key people in institutionalizing this course, along with the first batch of faculty members, took office at the CEAT building Room 102 and held classes at the same building.

First few students of EED

Since the department was institutionalized in the middle of the school year, they recruited students from different degree programs to transfer to the course. I was among the first batch to make the shift to the degree of Bachelor of Science in Electrical Engineering. The curriculum of this course can then be considered as the most advanced and challenging in its time. Electrical Engineering (EE) students were then required to take seasonal courses and we were the first engineering students to take the Physics 80 series with the Applied Physics brood. We were also required to take the then re-established Engineering Science (ES) 11 (Statics) and ES12 (Dynamics) subjects while the other engineering majors were still on ES11a (Statics and Dynamics).

I was on my second semester of my freshman year when I shifted to EE; on the next year, we were supposed to complete the first two of the Physics 80 series, finish on our Maths and eventually reach our third year where we will be encountering our first EE course: EE11 (Fundamentals of Electrical Engineering). At the start, since technically there were no EE students to teach yet, the faculty members occupied themselves with teaching Diploma courses on Electrical Engineering for the trainees of ASTEC. A strong institutional relation then existed with ASTEC and the department. In exchange for training their employees, they provided us with a lot of laboratory equipments and materials.

Several batches of transferees from other programs followed our batch, until the department finally welcomed batch 1998 as the first to take their UPCAT with the degree and start their freshman year as Electrical Engineering students. Since then, the department has been receiving a steadily increasing stream of applicants for the degree program.

After a short period of occupying CEAT room 102, the department was transferred to the current Instrumentation building along Pili drive. Our stay there was also short lived because the said establishment quickly became smaller as the students gradually increased in number. So we needed to transfer to a bigger space. That was when we were relocated to the current Industrial Engineering building. However, the need for bigger rooms and spaces continued to press itself. So when the construction of the Electrical Engineering building was completed, we immediately transferred in 2003. We are now settled at the Electrical Engineering building, together with the Dean's and College secretary's offices, and the CEAT library. Presently, the building provides sufficient space to the number of students that are taking up this course.


Christmas party of EED


Former EE Building (now the Instrumentation Section Bldg)

Construction of the New EE Building

Other than office hopping, the department is characterized by a high rate of faculty turnovers. Counting everyone from September 1996 to September 2012, we already had 42 faculty members who came in and went out. At present we have 13 faculty members and 2 lecturers, whom we hope to stay with us. It also experienced a few leadership transitions. After Prof Villanueva's term, **Prof. Edvino G. Eusebio** became the second chairman in August 2000; and after seven years, the chairmanship was bestowed upon me.

I started teaching after a semester of achieving the illustrious honour of being the very first graduate of the Electrical Engineering Program here at UPLB. I was already a licensed engineer when I started, so I could say that I am a bit prepared to take on the role of being an academician at such an early age. What I wasn't prepared of however, was the chairmanship position. I was still taking up my Master's degree when I was appointed as the Officer-in-charge of department. It proved to be quite a challenge because balancing teaching with administrative duties and masteral classes at UP Diliman is tiresome. Yet, I could consider balancing those three as one of the achievements that I could really be proud of since I was able to overcome those challenges.

The EE Department during one of their performances

Albeit the fast faculty turnovers, transitions in leadership and all the other misgivings of the department, the students never fail to perform well. From the very first Registered Electrical Engineering licensure examination that UPLB took part of until the last one at the moment, we have been consistently getting a 100% passing rate at almost all of the exams that we participated in. And we also expect ourselves to get that 100% passing rate at licensure examinations in the future. Along with the high calibre of professionals that we are contributing to the workforce, the licensure examinations is only one among the many marks of excellence of our graduates.

Through the years the department has already evolved in a lot of ways that I couldn't have ever imagined. It has experienced its shares of ups and downs; like moments when there were only two faculty members left and moments when we have a full house of new ones. It has learned a lot from the lessons that life brought it and it will continue to learn until the good and faithful Lord who held it intact wants it to. I was there at the beginning of this department, I am now here and I will be here as the department continues to excel by producing high calibre professionals, following the university's mandate to do research and contribute to the furtherance of the Electrical Engineering Industry.

The UPLB Department of Electrical Engineering Faculty and Staff
(Front row L-R: CB Juan, AP Lavega, ALC Pintor, RJA Marqueses, AMG Gabatin, KCC Agno, MAT Labrador;
2nd Row L-R: AAM Sumalde, MP Almanza, RL Marinas, MM De Ocampo, LM Llamera Jr., BP Damasco, ED Dulce, NL Perez, RL Catriz, JPA Ramoso, JDG Agsalud, RA Aguirre Jr., AR Gutierrez, RA Ramos, JG Corpuz, RA Parmis)

HISTORY OF THE UPLB BACHELOR OF SCIENCE INDUSTRIAL ENGINEERING: REMINISCING THE PAST

Haerold Dean Z. Layaoen
Assistant Professor and Chair
Industrial Engineering Department, CEAT, UPLB

The Bachelor of Science in Industrial Engineering (BSIE degree program was officially established in the University of the Philippines Los Baños (UPLB) under the College of Engineering and Agro-industrial Technology (CEAT) in the first semester of 1999-2000. The program was offered in response to the need to provide quality Industrial Engineering graduates in the Southern Tagalog region in particular and the Philippines, in general.

The first 8 students of UPLB IE program were all shiftees from various courses of Batch 1998 and Batch 1999. Among the Batch 1998 were **Aaron Austria** (BS Communication Arts), **Cherry Bocato** (BS Agribusiness Management), **Paul Andrew de Leon** (BS Applied Mathematics), **Kristianne Mercado** (BS Biology), and Frank Rayala (BS Communication Arts). For the Batch 1999, they were **Trima Dionila** (BS Mathematics), **Haerold Dean Z. Layaoen** (BS Agricultural Engineering) and **Paolo Antonio Lopez** (BS Agricultural Engineering). They all shifted to the course during the second semester of AY 1999 – 2000. Since then, the department had grown steadily. The first graduate of the UPLB IE program was **Haerold Dean Z. Layaoen**. He graduated in the Second Semester of AY 2003 – 2004.

To date, a total of 201 students already graduated in the said program with 7 *cum laude* graduates and averaging 28 the past 5 years. Student admission quota is presently 80 students per year, and present total enrollment is more or less 300 students.

In the first semester of AY 2001 – 2002, the IED faculty met with the IE shiftees of Batch 1998, 1999, and 2000 and enjoined them to form an academic student organization that would represent the department in various affairs and establish ties with other organizations and institutions inside and outside UPLB. Another aim for the move is to unite all IE students into one body. Because of the adversarial nature of the various academic student organizations representing a single course in UPLB; and by benchmarking the one-student-organization model of some other universities, the department issued a "One Academic Student Organization Policy". This move recognizes, nothing else, but the academic student organization which they helped establish.

In November 26, 2001, under the instruction and guidance of the faculty of IED, the UPLB Industrial Engineering Students Organization (UPLB – IESO) was founded.

IE Department Building

Since then, some of the joint activities they conducted include the yearly Student Faculty Meeting, Thesis and Practicum Awareness Seminar, Company Fieldtrips, Annual Book Sale, and Outreach Programs. In establishing ties with other organizations and institutions outside UPLB, IED and IESO joined the Philippine Institute of Industrial Engineers (PIIE). Yearly, IESO and IED join the annual National PIIE Congress and had hosted the said activity in 2007. The notable yearly regional activity jointly conducted by IESO and IED is the Southern Tagalog Industrial Engineering Seminar (STIES).

Current Development at IED

Currently, under the support of the Administration of **Chancellor Rex Victor O. Cruz** and **Dean Arnold Elepaño**, the department is on the process of establishing the Management Systems Engineering Program.

An extension building with facilities worth 5.5 Million approved by the previous administration of **Chancellor Luis Rey I. Velasco** and implemented by the current administration of **Chancellor Cruz** is currently being constructed and is expected to be completed by September of 2012. The current developments will significantly bolster the capability of IED in instruction, research, and extension activities.

Development of UPLB Industrial Engineering

The program was offered in response to the need to provide quality Industrial Engineering graduates in the Southern Tagalog region in particular and the Philippines

in general. The Importance of industrial engineering as a contemporary curricular offering may be appreciated by considering the history of other engineering disciplines. The first engineering discipline was military engineering. Though it was offered only in military academies, its origins could be traced back to the 18th century Europe when there was great concern for developing infrastructure for warfare. It did net take long before the application of military engineering in the construction of roads, bridges, and civilian buildings became so vital to economic and social development that civilian or civil engineering was instituted as a full-time university academic offering.

The invention of the steam engine and other machines created a need for men with specialized skills not only for their operation and maintenance but also for making improvements through more efficient and less costly designs. Thus, mechanical engineering was born.

Electrical engineering came with the invention of devices for generating electricity and the incandescent bulb. Power plants and electricity distribution networks were eventually designed and installed by graduates of this program.

Chemical engineering arrived when industry began the manufacture of explosives, petroleum products, paint, and other synthetic materials for industry and public use. Industrial engineering is quite new when viewed relative to the traditional engineering disciplines cited above. It was first offered at the Pennsylvania State University and Syracuse University in 1908. Professionals who could design integrated systems of labor, raw material, equipment, energy and information within an industrial organization for more effective management, higher efficiency and reduced operating costs were defined as industrial engineers. The discipline eventually will incorporated optimization on methodologies in operations research and computer technology as part of (current curricular offerings.

In the Philippines, the need for industrial engineers is expected to increase with the ongoing industrialization of the countryside. The favorable investment environment has resulted in the development of agro-industrial zones all over the country. It is a matter of public record that the U.P. System through the Diliman campus has been offering the BSIE program for more than 40 years now. In SY 95-96, UP Diliman's 45 graduates comprised less than 5 percent of the total output of 1007 graduates by about 33 universities and colleges offering the same program nationwide. In Region 4 alone, five schools graduated a total of 130 BSIE majors in SY 95-96.

University of the Philippines Los Baños, as one of the leading universities in the country, with well-trained faculty and available facilities, should contribute to the pool of well-trained industrial engineers to meet the needs of both the private and public sectors in the fast industrial regions of the Philippines, the southern Tagalog region, in particular.

Graduates of the proposed UPLB program like their counterparts in agricultural, chemical, civil, and electrical engineering will fill the manpower needs of the industrial, as well as science and technology parks, the existing and emerging industries in the CALABARZON, and the country in general. A small percentage of the graduates, particularly those with the inclination to teach or have gained valuable work-related experience, may apply for academic positions that may be, available in the many universities and colleges offering the industrial engineering program.

A needs survey based on weekend newspaper advertisement placements indicates an average of 31 non-repeating job positions for which graduates of the BSIE program can apply (an average of 7 weekends in 4 months). About 120 different positions are advertised per month, a dear indication that there is a sustainable demand for IE graduates. On this oasis, about 1600 industrial engineers are needed annually. This exceeds the graduate output of all 33 universities and colleges as previously mentioned. Based on the preceding estimates, there is an unfilled need for well trained BSIE graduates which UPLB can provide.

As unit of the UPLB, the Industrial Engineering Department (IED) is committed to the pursuit of academic excellence in its trilogy of functions: instruction, research and extension. Its primary mission is to provide leadership in the development of engineering knowledge for the efficient utilization of industrial resources and systems in ways that are consistent with the protection and conservation of the natural environment. The Department is to provide a curriculum that is responsive to current and future needs, coupled with real life learning experiences through scientific and applied thesis research or industry practicum.

Our objective is to prepare students for a professional Industrial Engineering career including a leading role in the design, improvement and installation of integrated systems of people, materials, information, equipment and energy. The Department covers four major areas of study namely: Operations Research and Management Science, Production Systems, Information Systems, and Ergonomics or Human Factors Engineering.

The Industrial Engineering Department is envisioned to become a Center of Development and later a Center of Excellence in Industrial and Systems Engineering in the Philippines under the national engineering education system of the Commission of Higher Education, and to serve as a national institute for R & D in industrial and systems engineering. ∎

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"Ang Kumpanyang Mapagkakatiwalaan at Maaasahan"

INSTITUTE OF AGRICULTURAL ENGINEERING

CREATION OF IAE

IAE was established on 17 April 1997 by the UP Board of Regents during its 1107th meeting to consolidate four degree granting academic units and one research, development and extension unit into one Institute.

MISSION

To provide leadership in Agricultural and Biosystems Engineering by continually upgrading the ABE program, producing graduates with the highest technical capabilities, spearheading state-of-the-art RDE, and being the model for other agricultural engineering schools in the country.

VISION

To become a premier institution of higher learning and a center of excellence in agricultural and biosystems engineering education, research &extension.

IAE UNITS

Agricultural Machinery Division (AMD)
Agricultural and Bio-Process Division (ABPROD)
Agrometeorology and Farm Structures Division (AFSD)
Land and Water Resources Division (LWRD)
Agricultural Mechanization Development Program (AMDP)

ACADEMIC PROGRAMS

BS in Agricultural and Biosystems Engineering major in:
- Agricultural and bio-process engineering
- Agricultural power and machinery engineering
- Agrometeorology and farm structures
- Land and water resources engineering

MSc in Agricultural Engineering major in:
- Agricultural and bio-process engineering
- Agricultural power and machinery engineering
- Land and water resources engineering

MSc in Agrometeorology

PhD in Agricultural Engineering major in:
- Agricultural and bio-process engineering
- Agricultural power and machinery engineering
- Land and water resources engineering

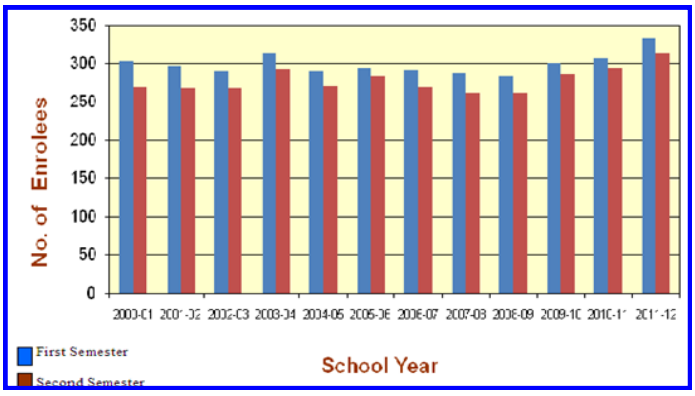
DISTINCTIONS

⇒ Center of Excellence in Agricultural Engineering
⇒ Top Performing School in Agricultural Engineering
⇒ National Center for Agricultural Engineering Research, Development and Extension
⇒ Member of the DOST's Engineering Research and Development for Technology (ERDT)

FACULTY PROFILE

Educational Attainment	AMD	ABPROD	AFSD	LWRD	TOTAL
Ph.D.	4	5	1	3	**13**
M.S.	4	1	3	4	**12**
B.S.	0	1	1	1	**3**
TOTAL	**8**	**7**	**5**	**8**	**28**

ENROLLMENT PROFILE



PERFORMANCE IN LICENSURE EXAMINATION

YEAR	PASSING RATE	TOP PLACERS
2012	95%	6th 7th
2011	93%	1st 6th 8th
2010	100%	3rd 5th
2009	89%	2nd 3rd 4th 6th 8th 9th 10th
2008	95%	1st 2nd 6th 8th 9th 10th
2007	86%	1st 3rd 5th 6th 7th 8th 9th 10th

AGRICULTURAL AND BIO-PROCESS DIVISION

INSTITUTE OF AGRICULTURAL ENGINEERING

MISSION

The division provides knowledge, technology, and leadership for the development and improvement of food, feed, and fibre processing and distribution systems that address human and environmental quality and safety concerns, and that are appropriate to the needs of Philippine industry stakeholders.

VISION

- To be an excellent provider of an educational experience to undergraduate and graduate students that will provide employment and business opportunities upon completion of the program;
- To be a leader and innovator in the application of engineering principles to bio-systems in the areas of postharvest engineering, food engineering, crop processing, and thermal / energy engineering; and
- To be a leader in inter-disciplinary and inter-agency activities that tackle complex problems in bio-processing.

GOALS

The division aims to:

1. attract and maintain a competitive and varied faculty profile that is knowledgeable in the areas of specialization of ABPROD;
2. develop, maintain, and upgrade laboratory facilities to cater to the needs of ABPROD's instructional and R&D needs; and,
3. develop strong institutional linkages with national and international agencies.

CURRICULAR PROGRAMS

ABPROD offers degrees in BS, MS, and PhD in Agricultural Engineering, major in Agricultural & Bio-Process Engineering. Courses are conducted with lectures and laboratory work, and supplemented by field trips to expose students to actual conditions.

Coursework for both graduate and undergraduate students covers heat and mass transfer, crop processing operations, physical properties of agricultural materials, and refrigeration systems.

Students are also encouraged to enrol in elective courses in other colleges to broaden their perspective, and increase their understanding. These electives may include courses in animal science, postharvest horticulture, agricultural economics, and food science.

FACILITIES AND EQUIPMENT

- Rheological Properties Laboratory
- Coconut Milling Laboratory
- Grain Quality Laboratory
- Refrigeration Laboratory
- Rice Mill
- Numerical Laboratory

RESEARCH AND DEVELOPMENT AREAS

- Postharvest Engineering
- Food Engineering
- Crop Processing
- Thermal / Energy Engineering
- Nanotechnology

AGRICULTURAL MACHINERY DIVISION

INSTITUTE OF AGRICULTURAL ENGINEERING

MISSION

The division aims to produce highly-trained graduates, develop cutting-edge and appropriate technologies, and provide expertise in the field of agricultural power and machinery for national development.

VISION

To become an institutional leader in agricultural power and machinery engineering instruction, research and extension.

GOALS

The division aims to:

1. develop invigorated and updated courses for instruction:
2. conduct client-oriented research in instrumentation and control system, imaging system, renewable energy and agricultural machine design and development and
3. extend to potential end-users mature technologies as soon as they are developed

CURRICULAR PROGRAMS

The Agricultural Machinery Division offers academic programs leading to BS degree in Agricultural and Biosystems Engineering and MS and PhD degree in Agricultural Engineering with major in Farm Power and Machinery Engineering.

Students majoring in AMD have the option to choose from the following fields of specialization:

- Agricultural Machinery Design and Development
- Renewable Energy Systems
- Machine Vision and Robotics
- Instrumentation and Control Systems
- Agricultural Ergonomics
- Tillage Systems
- Precision Agriculture

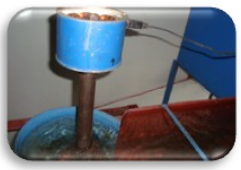
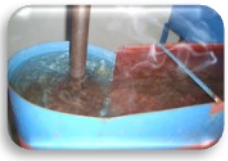
FACILITIES AND EQUIPMENT

- Agricultural Machinery Fabrication Shop
- Woodworking Facility
- Forging and Foundry Facility
- Power and Machinery Laboratory
- Soil Tillage Facility
- Instrumentation and Control Systems Equipment
- Machine Vision and Robotics Facility
- Renewable Energy Facility

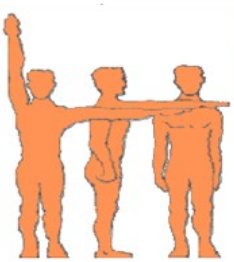
RESEARCH AND DEVELOPMENT AREAS

- Agricultural machinery design and development
- Non-destructive quality inspection and evaluation of agricultural products
- Mechatronics application in agriculture and biosystems
- Agricultural ergonomics
- Precision agriculture
- Renewable energy







AGROMETEOROLOGY AND FARM STRUCTURES DIVISION

INSTITUTE OF AGRICULTURAL ENGINEERING

CREATION

AFSD started in 1956 as a section of the Department of Agricultural Engineering in the UP Los Banos College of Agriculture. It was later transformed to the Department of Agrometeorology (AGMET) when the Institute of Agricultural Engineering & Agro-Industrial Technology (INSAET) was founded in 1976; with the addi-tion of other academic programs, INSAET became the College of Engineering & Agro-Industrial Technology (CEAT) in 1983. AGMET was renamed as the Agrometeorology & Farm Structures Division (AFSD) when the Institute of Agricultural Engineering (IAE) was created in 1997.

MISSION

The division aims to develop students who, and appropriate technologies that, can translate sky-high weather problems into manageable ground level solutions which farmers and entrepreneurs can implement in a changing global climate.

GOALS

The division aims to:

1. harness crop yield potential from favourable weather as well as weather extremes;
2. improve crop and animal production by developing controlled environment technologies; and
3. minimize environmental impact of agricultural wastes

CURRICULAR PROGRAMS

BS Agricultural Engineering (major in Farm Structures & Environment)

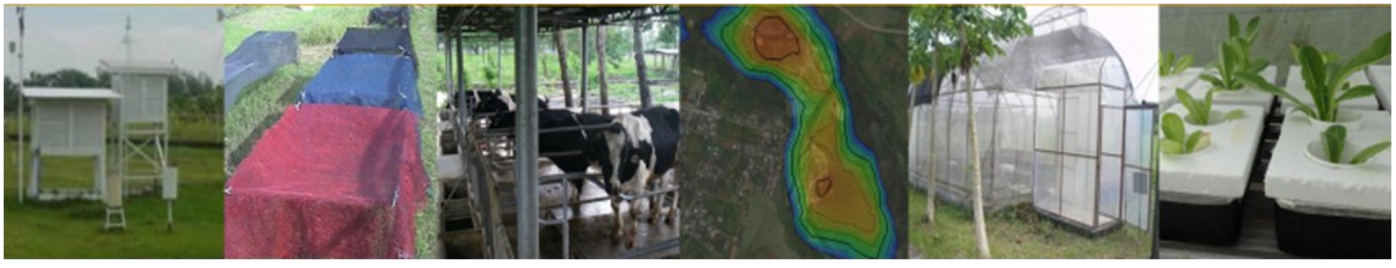
MS Agrometeorology – an interdisciplinary field of study which relates the elements of atmospheric environment with agri-business operations. It is designed to prepare graduate students in dealing with weather-related problems affecting agricultural productivity form the long-range planning to the daily operation

FACILITIES AND EQUIPMENT

- UPLB National Agromet Station
- Automatic Weather Station
- Experimental Field
- GIS / Computer Room

RESEARCH AND DEVELOPMENT AREAS

- Agrometeorology / Meteorology
- Structures and Environment
- Geographic Information Systems & Remote Sensing Applications
- Waste Management, Energy, & Climate Change



LAND AND WATER RESOURCES DIVISION

INSTITUTE OF AGRICULTURAL ENGINEERING

MISSION

- To provide national leadership in graduate and undergraduate instruction in land and water resources engineering and technology;
- To assume a lead role in developing integrated plans and policies in land and water resources conservation, development and utilization;
- To spearhead the conduct of developmental and policy oriented studies concerning land and water resources utilization and conservation;
- To pursue active involvement in the process of technology transfer at the local and national levels; and
- To serve as a center for identifying critical information gaps, compiling, analyzing and generating baseline information and identifying potential growth points in land and water resources development.

VISION

To provide national leadership in land and water resources engineering instruction, research and extension.
The division aims to:

GOALS

1. To provide formal training in land and water resources engineering
2. To undertake research geared towards exploring solutions to relevant problems in land and water resources engineering
3. To extend technical expertise and information about land and water resources engineering through consultancy, non-degree training programs, and publication

CURRICULAR PROGRAMS

The LWRD offers academic programs leading to BS degree in Agricultural and Biosystems Engineering and MS and PhD degree in Agricultural Engineering with major in Land and Water Resources Engineering and Technology.

Coursework for both graduate and undergraduate students covers engineering aspects of hydrology and hydraulics; irrigation and drainage; aquaculture; water quality and environment; soil and water conservation; and land and water resources systems.

Courses are conducted with lectures and laboratory work, and supplemented by field trips to expose students to actual conditions.

FACILITIES

- Hydraulics Laboratory
- Soil & Water Conservation Laboratory
- Water Quality Laboratory
- Aquaculture & Aquaphonics Facility

RESEARCH AND DEVELOPMENT AREAS

- Hydrology
- Irrigation and Drainage Engineering
- Aquaculture Engineering
- Soil Erosion and Sediment Transport
- Soil-Plant-Water Relationships











AGRICULTURAL MECHANIZATION DEVELOPMENT PROGRAM

INSTITUTE OF AGRICULTURAL ENGINEERING

CREATION

AMDP was established in 1979 by the College of Engineering and Agro-Industrial Technology (CEAT) (then Institute of Agricultural Engineering or INSAET) of the University of the Philippines Los Baños, as its research and development and extension program in agricultural mechanization. In 1997, AMDP became part of the Institute of Agricultural Engineering of CEAT through the Board of Regents 1107th meeting on 17 April 1997.

Since its inception, AMDP has tackled various activities that contributed in increasing agricultural productivity, improving the income of farmers, manufacturers and entrepreneurs, and shaping the RD&E and policy directions of mechanization in the country.

MISSION

Provide innovative agricultural and bio-systems engineering technology through cutting edge research, strategic extension delivery methods, synergistic networking, and responsive policy advocacies towards environment-friendly, gender sensitive and sustainable agriculture and fisheries modernization.

VISION

AMDP's vision aims for a progressive and globally competitive Philippine agriculture transformed by integrated research and development systems, technology transfer mechanisms and holistic policy environment responsive to the challenges of climate change and global free trade.

GOALS

In general, AMDP's goal is to help provide and promote sustainable and profitable Philippine farming condition through:

1. Improvement of the production and post-production system of the agro-fisheries sector;
2. Improvement of the local manufacturing system and linkages with foreign counterparts;
3. Development of agro-fisheries business enterprises;
4. Strengthening RD&E capabilities of SCUs;
5. Development of specialized technology packages for agri-aqua mechanization;
6. Increasing adoption of agro-fisheries mechanization technologies;
7. Increasing generation and adoption of renewable and other alternative sources of energy; and
8. Improving the support system through appropriate policy recommendations.

CORE COMPETENCIES AND CAPABILITIES

- Conduct of basic research
- Design and development of agricultural machinery
- Testing and evaluation of agricultural machinery
- Conduct mechanization needs assessment and analysis
- Development of mechanization technology packages
- Conduct of machinery demonstrations and exhibits
- Development of training manuals, brochures, and other information dissemination materials
- Conduct of training
- Provision of technical assistance and expert services
- Formulation of policies

THE CHEMICAL ENGINEERING DEPARTMENT

The roots of the **UPLB-CEAT Chemical Engineering Department** may be traced back to the UP College of Agriculture (UPCA) Sugar Technology Program (STP). Its history started in 1920 when a Certificate in Sugar Technology was conferred on Agricultural Chemistry students. In 1925, a 5-year BS Sugar Technology (BSST) curriculum was formally instituted until the last graduates of the pre-World War II curriculum obtained their degrees in 1942. In 1955, the offering of BSST resumed but discontinued in 1965. In 1968, BSST was reinstituted and the first Sugar technology Board examination was given in August 1973. Through the leadership of former UP President Emil Q. Javier, the STP, then a joint program of CA and CAS, was merged with INSAET to form the College of Engineering and Agro-Industrial Technology (CEAT) in 1983. Harnessing all the STP resources, the Chemical Engineering Department was created. On March 7, 1985, the UP Board of Regents approved the institution of the BS Chemical Engineering curriculum and in 1988, Sugar Technology was included as a major in BS ChE. Since then, strengthening and revitalization of ChE curricular offerings were initiated and implemented.

The department envisions itself to be in the forefront of effective leadership in chemical engineering instruction, research and extension functions in other relevant engineering disciplines with which it inter-phases during its dynamic growth and development. Its mission is to enhance the nation's human and technological resources through quality chemical engineering education, research, extension and community service. It has been involved in researches in environmental engineering, biochemical engineering, alternative energy and food engineering.

Faculty and Staff of ChED

At present, the department offers three options to its undergraduate students: BS ChE (general), major in Sugar Technology, and the major in Pulp and Paper Technology. The department also offers the MS in Chemical Engineering and the MS in ChE with Specialization in Pollution Engineering, which generally aim to provide chemical engineers a greater opportunity for improving or developing further their capabilities in providing quality instruction and in undertaking research and development projects. Its faculty is composed of two professors, two associate professors, four assistant professors and eight instructors assisted by three administrative staff.

From its institution, the department has produced top-caliber graduates landing high positions in the industry. It has produced a total of 1,249 graduates, 78 of which are cum laude, 10 magna cum laude and one summa cum laude. It has also become one of the top performing schools in the Chemical Engineering Licensure Examinations producing 64 graduates in the top 10, 6 of which are the top 1.

The department is equipped with analytical, environmental, thesis and unit laboratories, audio-visual rooms and instrumentation room. In the next years, the department will carry on its tradition of excellence in Chemical Engineering instruction, research and extension.

THE CIVIL ENGINEERING DEPARTMENT

The B.S. Civil Engineering curricular program was proposed in 1991 and was first offered in June 1992. **Dr. Danielito T. Franco** was appointed as the first program leader and followed by **Dr. Victor S. Luis, Jr.** in 1994. No Civil Engineering courses were offered during its first two years since there was no need for them. It was only in June 1994, when regular staff of the Civil Engineering Department were recruited. These were **Ms. Purificacion A. Orno**, and Messrs**. Marloe B. Sundo, Jennifer R. Bacud,** and **Vicente D. Pastor.** In 1995, **Dr. Senen M. Miranda** was appointed as the first department chair.

In 1997, the department started to hire the best and the brightest among its graduating class. **Dr. Marish S. Madlangbayan**, the head of his class, was the first graduate to be hired. In 1998, **Ferdinand F. Bengusta**, a CE board exam topnotcher, became the second graduate of the department to be hired. The hiring of the best graduates of the department was continued the same year and thereafter.

Curricular Programs

The present curriculum of the 5-year B.S. Civil Engineering Degree has a total of 190 units. The program involves the following fields of specialization (taken compulsory): Structural Engineering, Geotechnical Engineering, Environmental and Water Resources Engineering, Transportation Engineering and Construction Engineering. The student would usually take-up these specialized courses on their third year of the curriculum.

Research and Extensions

The current researches done in the department are the study on the durability of concrete and modeling of local rivers and creeks. The major proponents of these researches are **Dr. M.S. Madlangbayan** and **Dr. E.V. Ana, Jr.** These studies were then undertaken by senior students producing numerous thesis output. With this, the number of produced undergraduate thesis outnumbered the manuscript output (practicum base) which is the total opposite many years before. This marks an important milestone for the development of the department.

Faculty and Staff

(Left to right) Ginghis Maranan; Chairman Marish Madlangbayan; Dan Sadia; Eliseo Ana, Jr. (top) Richelle Zafra; Sofia Merin (secretary); Sunseehray Banaña and Kimberly Solon (bottom)

At present, the department has one administrative staff, **Sofia L. Merin**, and one laboratory technician, **Rodel A. Deriquito**, with 11 faculty members: **Dr. Marish M. Madlangbayan** (Chairman); **Dr. Richelle G. Zafra; Dr. Eliseo V. Ana, Jr.**; **Asst. Prof. Marloe B. Sundo** (on study leave); **Asst. Prof. Ginghis B. Maranan**; **Asst. Prof. Perlie P. Velasco**; **Engr. Dan Michael A. Sadia**; **Engr. Sunseehray B. Tirazona**; **Engr. Joseph M. Caburnay; Engr. April Joy B. Coleta; and Engr. Jason A. Polinag**.

The Electrical Engineering Department

The Department of Electrical Engineering came into existence upon the approval of UPLB Board of Regent on September 26, 1996.

Its vision is to become a Center of Excellence in the field of Electrical Engineering.

The department's mission is to contribute to the progress of Science and Engineering by pursuing high-quality and relevant research and academic activities. The department also aims to provide high-quality education which makes use of progressive educational philosophies and advanced technical tools that would produce competent Electrical Engineers. It also desires to conduct high-level research and consultancy with an emphasis on application of knowledge through an academe-industry linkage and to maintain a creative and innovative learning and research environment that would enable students and staff to engage in development of the emerging technologies.

Department of Electrical Engineering

Faculty and Staff

As of June 2012, the Department of Electrical Engineering has a total of 11 faculty and 8 staff members.

Board Exam Performances

Since its establishment on September 1996, the department was able to maintain outstanding performance in the Registered Electrical Engineering Licensure Examination held twice a year, September and April intake. For more than a decade since its establishment, the Department of Electrical Engineering had always been able to bring prestige through a 100 percent passing rate in the licensure examination.

Outstanding Project

Department of Electrical Engineering ranked 1st place in the BPI-DOST Science Awards 2012 through the undergraduate thesis presentation entitled "Analysis on the effect of various factors to the voltage drop of a Single-Wire Earth Return (SWER) distribution system in Lipa soil series" of Engr. Chiliast B. Juan,under the supervision of his thesis adviser Asst. Prof. Roderick L. Catriz.

Date of Exam	No. of Examinees	UPLB Passing Rate	National Passing Rate
Sept 2001	2	100%	48.33%
April 2002	2	100%	41.93%
Sept 2002	5	100%	46.78%
April 2003	3	100%	32.86%
Sept 2003	13	100%	31.19%
April 2004	8	100%	36.76%
Sept 2004	19	94.74%	42.38%
April 2005	9	100%	42.37%
Sept 2005	13	100%	45.39%
April 2006	19	100%	43.34%
Sept 2006	31	100%	41.02%
April 2007	11	100%	33.05%
Sept 2007	21	100%	33.70%
April 2008	6	100%	28.27%
Sept 2008	33	100%	29.56%
April 2009	14	93%	35.20%
Sept 2009	16	93.75%	42.14%
April 2010	20	100%	28.37%
Sept 2010	26	100%	33.99%
April 2011	13	100%	40.43%
Sept 2011	18	100%	58.02%
April 2012	18	100%	43.69%

THE INDUSTRIAL ENGINEERING DEPARTMENT

The Industrial Engineering Department was officially established on May 27, 1999 as a unit of College of Engineering and Agro-Industrial Technology (CEAT). The program was offered to provide quality Industrial Engineers in the Southern Tagalog region in particular and the Philippines in general.

The department's mission is to provide leadership in the development of engineering knowledge related to the efficient utilization of industrial resources and systems in ways that are consistent with the protection and conservation of the natural environment. The IED's vision is to serve as a center of excellence for Industrial Systems Engineering in the Philippines under the National Engineering Education System of the Commission on Higher Education, and to serve as a national institute for research and development in industrial and systems engineering.

Currently, the department is composed of its chairman, **Asst. Prof. Haerold Dean Layaoen**, with eight full-time faculty members. The IED faculty is composed of seven BSIE graduates and one MS Finance graduate. As part of the faculty advancement program, six faculty members are pursuing their Master's degree in Industrial Engineering to further improve in instruction and research.

(Left-to-Right) Mark Baldoz, Mikel Yap, Marc Isip, Chairman Haerold Layoen (top); Diana de Silva, Lizbeth Mariano, Kathleen Lee, Clarissa Pesigan, and Marites Castro (bottom)

IED offers the five-year Bachelor of Science in Industrial Engineering Program. It consists of 189 total units. It includes a practicum, wherein students are exposed to actual industry experience, or a thesis, which provides the students an opportunity to contribute to the general knowledge base of IE.

Systems Modeling Lab; Ergonomic & Methods Engineering equipment

In order to cater the needs of the increasing student population, the department continuously improves its facilities. Currently, it consists of four fully air-conditioned classrooms (two are on-going construction as of this writing), a Systems Modeling Lab with 12 computer units along with computer software, and an Ergonomic & Methods Engineering Lab equipped with instruments and tools for instruction and research.

The department is also on its initial stage of developing the Management Systems Engineering Program (MSEP) in line with UP's "self-sustainability" program. It will apply engineering principles to identify, analyze, and solve management problems throughout a client organization with the aid of computers and software (SAP, ProPlanner®, AccuProcess Modeler, etc.). It will use the Php 1 million seed money from the UPLB World Class University and Distinctive Excellence Fund to establish its working framework. Upon establishment, it should be able to sustain itself for its operations and maintenance through funds generated from research, trainings, and consultations.

THE ENGINEERING SCIENCE DEPARTMENT

The **Department of Engineering Science (DES)** is the multi-disciplinary department of the College of Engineering and Agro-industrial Technology (CEAT). It was established in 1987 when CEAT was elevated to a full-fledged College from the former Institute of Agricultural Engineering and Technology (INSAET) of the College of Agriculture. The DES was conceived primarily to handle basic engineering courses and to serve as a springboard from which additional departments could evolve.

Goals and Vision

Excellence in engineering science education:

To pursue a high quality administration of basic engineering science courses by providing continuous teacher-student learning performance support systems; to create state-of-the-art teaching and learning facilities; and, to rationalize and to upgrade the various curricular offerings according to the needs of different engineering degree programs.

Excellence in engineering science research:

To engage in basic researches in engineering science and material science in response to the current and anticipatory needs of industries.

Excellence in information technology applications:

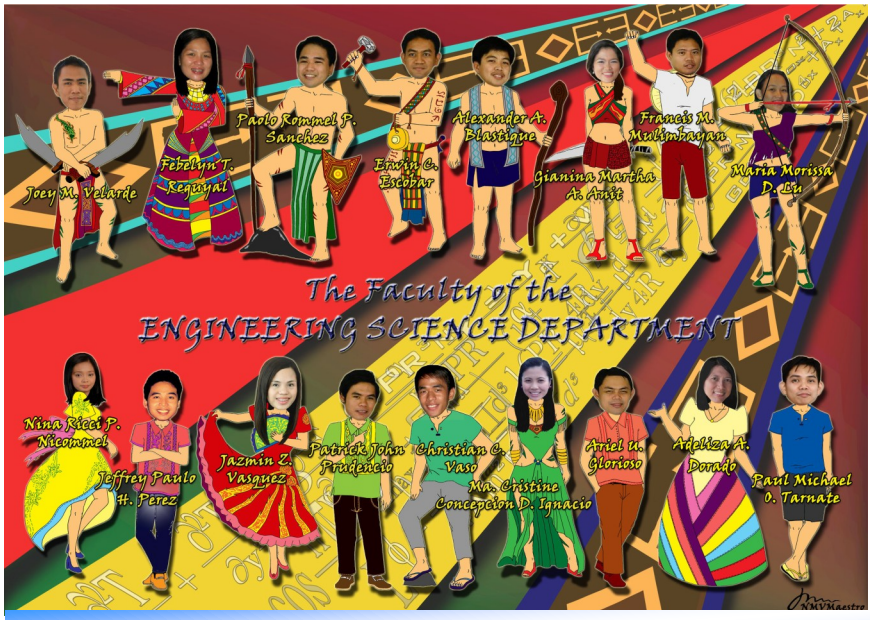
To create a strong engineering information technology foundation for the college and for the industries through the expansion and upgrading of information technology resources; and, to create efficient information structures and a powerful information base.

Extension Activities

Some faculty members of the DES serve as UP Pahinungod Volunteers. Also, the DES co-sponsors a nationwide inter-collegiate Engineering Science quiz contest.

Facilities

The Department has a lecture hall, three lecture rooms, two computer rooms, and a drafting room.



Faculty and Staff of Engineering Science Department

AGRICULTURAL MACHINERY TESTING AND EVALUATION CENTER

BACKGROUND

The Agricultural Machinery Testing and Evaluation Center (AMTEC) was established in 1977 by virtue of a Memorandum of Agreement between the Department of Agriculture and the University of the Philippines Los Baños. This was in recognition of the need for an official testing agency to promote a self-reliant agricultural machinery industry that would cater to the needs of the Filipino farmers.

AMTEC is administered by the College of Engineering and Agro-industrial Technology (CEAT). Annual budgetary requirement of AMTEC comes from UPLB and income from testing and evaluation of agricultural machinery.

MISSION

AMTEC shall establish standards of performance of machinery, conduct laboratory and field tests of machinery, Evaluate the results using rationalized criteria, and disseminate the information to concerned agencies, farmers and fisher folks.

VISION

The establishment of a national center that will test and evaluate the performance of agricultural and fisheries machinery to the benefit of Filipino farmers and fisher folks.

THE CEAT DEAN'S OFFICE

The Dean's Office's primary function is to manage the operations of the whole college. The unit also assist in the implementation of policies and takes directive from the College Dean and the University Administration.

The CEAT Dean's Office Unit is currently headed by **Dean Arnold R. Elepaño** followed by Associate Dean **Dr. Richelle G. Zafra**. **Ms. Marivic L. Mendoza** is the Administrative Officer V of the Dean's Office unit and under Ms. Mendoza are: **Ms. Aurora L. Sasa**, Administrative Officer 3, in-charge of Records and Human Resources Management and **Rusellen E. Baraquio** Administrative Officer 2, who is in-charge of supplies and property management and finance. **Ms. Myline Punzalan**, Dean's office assistant, handles Instruction and Student Matters while Mr. Ramir G. Gonzales is the unit's Administrative Aide 3. Under the Dean's Office are two other supporting units: The Office of the College Secretary (CSO) and the CEAT Library.

Office of the College Secretary

The Office of the College Secretary (CSO) is the official repository of students' academic records and responsible for the implementation of admission requirements and registration of the students.

The CSO is headed by **Ms. Ma. Cristine Conception D. Ignacio** as the College Secretary. The College Secretary reports directly to the College Dean and under the College Secretary are the following staff: **Ms. Leonor B. Ramos**, Student Records Evaluator II, Ms**. Annaliza D. Manua**l, Administrative Assistant 2 and **Ms. Loyola A. Lantican**, Administrative Officer 1.

CEAT Library

The CEAT Library unit provides information resources and services to CEAT constituents that support the academic, research, development and extension activities of the college.

The CEAT Library unit is under the Dean's Office unit and is headed by the CEAT Library Committee. **Ms. Lina C. Copioso** serves as the College Librarian and reporting directly under the college librarian are **Mrs. Myrna D. Punzalan** and. **Mrs. Connie Orte** as Administrative Aide 3 and **Mr. Antonio M. Bucog** as the Laboratory Technician I.

CEAT UNIT HEADS

IAE DIRECTORS

Danielito T. Franco	1997-2000
Sergio C. Capareda	2000-2003
Romualdo B. Firmalino	2003-2006
Arsenio N. Resurreccion	2006-2008
Arnold R. Elepaño	2008-2011
Rossana Marie C. Amongo	2011-present

AGMET/AFSD CHAIRS

Maximo W. Baradas	1976-1979
Petronio S. Ongkingco	1979-1980
Virgilio G. Gayanilo	1980-1986
Danielito T. Franco	1986-1987
Avelino M. Ramirez	1987-1993
Manuel C. Puma	1993-1995
Maximo W. Baradas	1995-1996
Moises A. Dorado	1997-2000
Larry C. Guerra	2001
Alejandro M. de Asis	2001-2003
Avelino M. Ramirez	2003-2007
Alejandro M. de Asis	2007-2008
Ronaldo B. Saludes	2008-present

AGPET/ABPROD CHAIRS

Ernesto P. Lozada	1976-1982
Silvestre C. Andales	1982-1986
Emerico R. Mendoza	1987-1990
Virgilio G. Gayanilo	1990-1993
Engelbert K. Peralta	1994-1995
Ponciano S. Madamba	1996-1999
Arnold R. Elepaño	1999-2000
Engelbert K. Peralta	2001
Arnold R. Elepaño	2002-2008
Kevin F. Yaptenco	2009-present

DAMET/AMD CHAIRS

Reynaldo M. Lantin	1976-1977
Manuel M. Vergel, Jr.	1977-1978
Arsenio N. Resurreccion	1979-1980
Carlos R. Del Rosario	1980-1984
Delfin C. Suministrado	1984-1986
Aurelio A. Delos Reyes, Jr.	1986-1990
Maximo G. Villanueva	1990
Sergio C. Capareda	1990-1996
Carlos R. Delos Reyes	1997-1998
Sergio C. Capareda	1998-2000
Pepito M. Bato	2000-2001
Bernabe L. Paita	2002-2005
Fernando O. Paras, Jr.	2005-2007
Delfin C. Suministrado	2007
Rossana Marie C. Amongo	2007-2008
Omar F. Zubia	2008-2009
Pepito M. Bato	2009-present

LAWREAT/LWRD CHAIRS

Wilfredo P. David	1976-1987
Danielito T. Franco	1987-1990
Romualdo B. Firmalino	1990-1996
Catalino U. Collado, Jr.	1997-1998
Victor S. Luis, Jr.	1998-2000
Victor B. Ella	2001-2003
Manolo G. Villano	2003-2006
Catalino U. Collado, Jr.	2006-2008
Rosa B. Delos Reyes	2008-2009
Aurelio A. Delos Reyes, Jr.	2009-2012
Roger A. Luyun, Jr.	2012-present

AMDP PROGRAM DIRECTORS

Reynaldo M. Lantin	1979-1983
Carlos R. del Rosario	1984
Ernesto P. Lozada	1985-1986
Silvestre C. Andales	1987
Arsenio N. Resurreccion	1988-1991
Wilfredo P. David	1992
Ernesto P. Lozada	1993-1998
Virgilio G. Gayanilo	1998-2000
Sergio C. Capareda	2001-2003
Reynaldo I. Acda	2003-2005
Arnold R. Elepaño	2005-2011
Rossana Marie C. Amongo	2011-present

CHEMICAL ENGINEERING DEPT. CHAIRS

Dr. Casiano S. Abrigo	1985-1991
Dr. Reynaldo I. Acda	1991-1997
Prof. Rex B. Demafelis	1997-2003
Prof. Myra G. Borines	2003-2005
Prof. Rex B. Demafelis	2005-2008
Dr. Jovita L. Movillon	2008-2011
Dr. Catalino G. Alfafara	OIC, June 2011-Sept 2011
Dr. Manolito E. Bambase	OIC, Sept 2011-Dec 2011
Dr. Manolito E. Bambase	Chair, Jan. 2012-Present

CIVIL ENGINEERING DEPT. CHAIRS

Danielito T. Franco	1992-1994
Victor S. Luis, Jr.	1994-1995
Senen M. Miranda	1995-2002
Jennifer R. Bacud	2002-2004
Marloe B. Sundo	2004
William T. Tanzo	2004-2005
Marish S. Madlangbayan	2005
Ferdinand F. Bengusta	2005-2006
Marloe B. Sundo	2006-2010
Marish S. Madlangbayan	2010-present

ELECTRICAL ENGINEERING DEPT. CHAIRS

Maximino G. Villanueva	1997-2000
Edvino G. Eusebio	2000-2007
Roderick L. Catriz	2007-present

INDUSTRIAL ENGINEERING DEPT. CHAIRS

Danielito T. Franco	1999-2003
Herbert T. Manaligod	2004
Lindley R. Bacudio	2005-2006
Herbert T. Manaligod	2007-2008
Aurelio A. Delos Reyes, Jr.	2009-2011
Haerold Dean Z. Layaoen	2012 - current

ENGINEERING SCIENCE DEPT. CHAIRS

Maximino G. Villanueva	1985 – 1987
Victor S. Luis, Jr.	1987 – 1990
Danielito T. Franco	1990 – 1996
Sergio C. Capareda	1996 – 1997
Adeliza A. Dorado	1997 – 1999
Jasper G. Tallada	1999 – 2001
Delfin C. Suministrado	2001 – 2002
Pepito M. Bato	2002 – 2004
Ronald R. Navarro	2004
Wilfredo G. Tuso III	2004 – 2005
Jessie C. Elauria	2005 – 2012
Erwin C. Escobar	2012 – present

AMTEC DIRECTORS

Roberto C. Bautista	1977-1980
Andres P. Aglibut	1980-1981
Isagani A. Sarmiento	1982-1986
Carlos R. del Rosario	1987-1989
Virgilio G. Gayanilo	1990-1998
Arsenio N. Resurreccion	1999-2006
Pepito M. Bato	2006-2007
Delfin C. Suministrado	2007-present

ASSOCIATE DEANS

Maximino G. Villanueva	1984-1987
Carlos R. del Rosario	1987-1990
Victor S. Luis, Jr.	1990-1993
Delfin C. Suministrado	1993-2002
Jessie C. Elauria	2002-2004
Moises A. Dorado	2005-2008
Rossana Marie C. Amongo	2008-2011
Richelle G. Zafra	2012-present

COLLEGE SECRETARIES

Abraham A. Caoili	1976-1977
Danielito T. Franco	1978
Arsenio N.Resurreccion	1978
Maximino G. Villanueva	1979-1982
Catalino U. Collado, Jr.	1983
Jovita L. Movillon	1983-1986
Delfin C. Suministrado	1986
Abraham A. Caoili	1986-1987
Jovita L. Movillon	1987
Abraham A. Caoili	1987-1988
Jovita L. Movillon	1988-1991
Abraham A. Caoili	1991
Jovita L. Movillon	1992
Delfin C. Suministrado	1993
Abraham A. Caoili	1993
Catalino U. Collado, Jr.	1993-1994
Abraham A. Caoili	1994-1999
Adeliza A. Dorado	1999-2000
Maximino G. Villanueva	2000
Prof. Jovita L. Saquing	2001
Antonio Gabino P. Sobremisana	2002-2006
Myra G. Borines	2006-2009
Marion Lux Y. Castro	2009-2011
Ma. Cristine Concepcion D. Ignacio	2012-present

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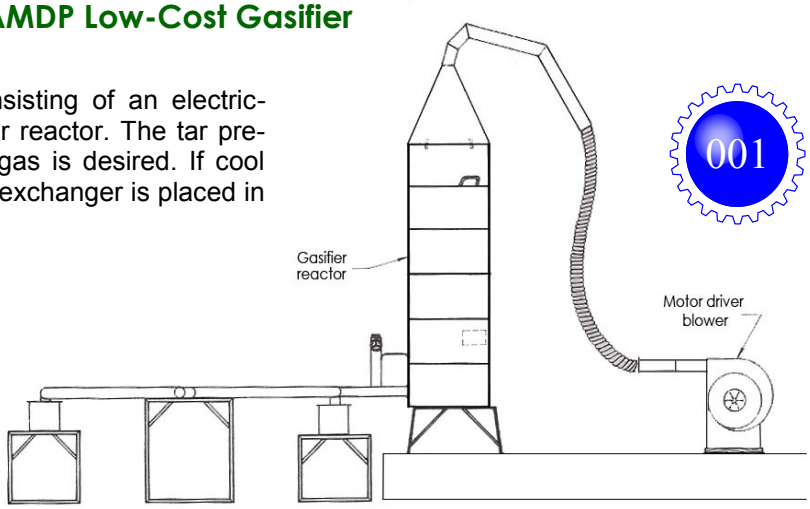
AGPET-AMDP Low-Cost Gasifier

DESCRIPTION

The gasifier is a downdraft equipment consisting of an electric-motor driven, low-pressure blower and a gasifier reactor. The tar pre-cipitator/heat exchanger is removed if hot fuel gas is desired. If cool synthetic gas is desired, the tar precipitator/heat exchanger is placed in series with the outlet of the gasifier reactor.



FEATURES

- Low initial cost
- Low operational cost needing only 0.5 motor horsepower
- Hot gas production lasts from 1.5 to 3.5 hours

AMDP-ABPROD Municipal Solid Waste Management Program

DESCRIPTION

The AMDP-ABPROD Municipal Solid Waste Management Program is a technology designed to facilitate then handling of biodegradable wastes at a municipal or small-community level. It consists of several machines for a small to medium-scale processing facility for bio-organic fertilizer production from biodegradable wastes.

FEATURES

- Technology components include: shredder, hammer mill, pelletizer, sifter/grader, mixer and flatbed dryer which are all locally-manufactured.

Electrically-Heated Hot Water Tank

DESCRIPTION

The technology was conceptualized at UPLB's Postharvest Horticulture Training and Research Center to prevent infestation and arrest the deterioration of Carabao mangoes for export. The machine was further improved and fitted with automatic controls at the Agricultural and Bio-Process Division of the IAE.

FEATURES

- 160-kg or 440-kg batch capacity
- 1500 kJ per min heating rate with temperature variation of 0.5 C or less
- Equipped with digital thermostat and LPG heating with auto-ignition
- Separate water heating and fruit dipping chambers
- Stainless steel (food grade) body.

FD-50 and FD-200 Solar-Biomass Fruit Dryers

DESCRIPTION

The FD-50 and FD-200 fruit dryers were developed for selected cooperative and fruit processing industry. These were pilot-tested on pineapple (Formosa), mangoes (Carabao), and banana (Saba). The FD-50 was also tested on Banaba leaves for herbal drying application.

004

FEATURES

FD-50

- 50 kg sliced fruit/batch capacity
- Fuelled by coconut shell or charcoal with solar collector area of 212 x 90 cm
- Dryer dimensions of 140 x 100 x 269 cm
- Thirty (30) trays whose dimensions are 98 x 50 cm
- Trays are aluminum wire screen or polyethylene plastic screen
- Fan airflow rate: 0.16 m^3/s with fan diameter of 30.48 cm

FD-200

- 200 kg sliced fruit/ batch capacity
- Fuelled by rice hull
- Dryer dimensions of 290 x 137 x 200 cm
- Fifty-two (52) trays whose dimensions are 95 x 98 cm

Hybrid Solar-Biomass System for Ceramic Drying

DESCRIPTION

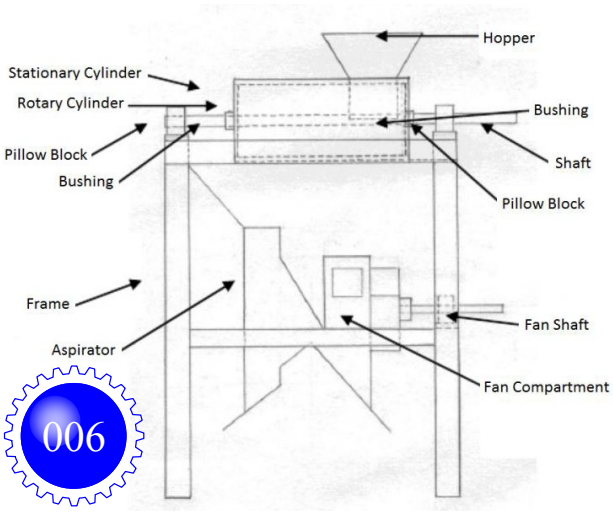
The hybrid dryer is a closed-loop system complete with state of the art instrumentation to control both temperature and humidity inside the drying chamber. The system has two main sources of heat connected in series. The biomass serves as the primary heat source and the solar collector serves as the secondary.

005

FEATURES

- Designed to dry 108 pots (20kg @ from 25% to 5%) in 16 hours. Typical shade drying of similar pots normally takes 4 days to dry.
- High recovery (~95%)
- With automatic controls which simplify the operation and reduce operator error.

Jatropha Sheller



006

DESCRIPTION

The Jatropha Sheller is a locally-fabricated machine for the pre-processing of fruits from the oil- crop *Jatropha curcas*. It was optimized to obtain the highest recovery, shelling capacity, whole kernel recovery and oil recovery, and to obtain the lowest bulk density factor and energy utilization for shelling and oil extrusion

FEATURES

- Locally-fabricated, relatively cheaper and easier to maintain and troubleshoot.
- Optimum operating conditions of 9.5% moisture content, clearance of 6mm, and roller speed of 750 rpm.
- Shelling recovery as high as 98 % at the optimum operating conditions.

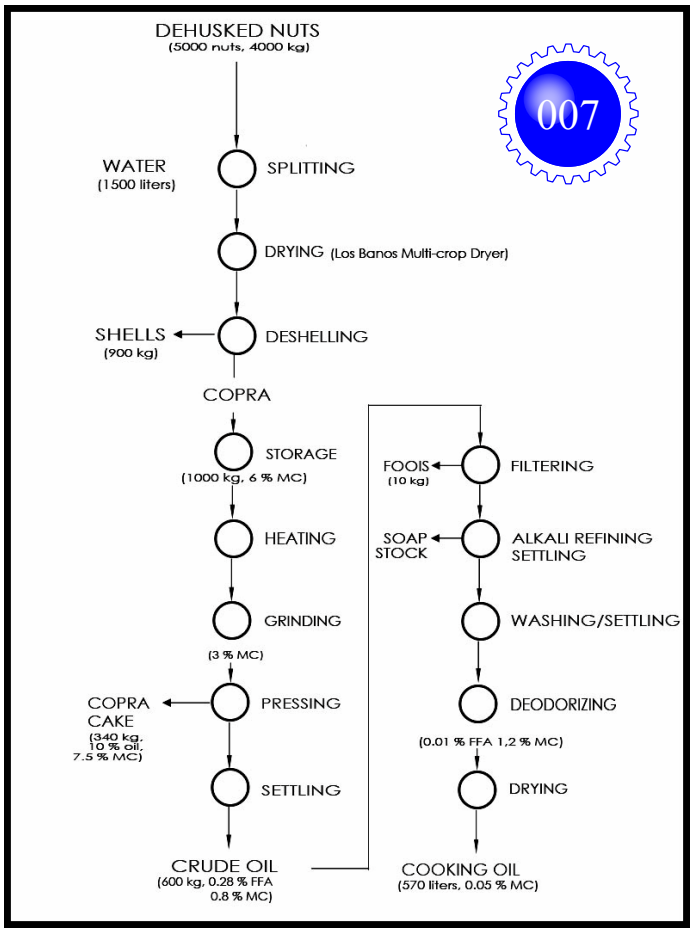
Los Baños Fresh-Dry Methods for Integrated Coconut Processing

DESCRIPTION

The technology/machinery package on fresh-dry integrated coconut processing produces edible cooking oil and high grade copra cake. It is a simple technology which can be managed and operated by farmers' cooperatives. The technology consists of the Los Baños Multi-Crop Dryer, expellers, a deodorizing system, hammer mill, drop tank, filter press and several small laboratory items.

FEATURES

- Locally-fabricated components
- Designed for a small mill processing 5000 coconuts/day which yields 600 kg crude oil
- Can produce 463.5 kg cooking oil for every 500 kg crude oil, and 280 bars of soap (500 g) for every 100 kg crude oil.



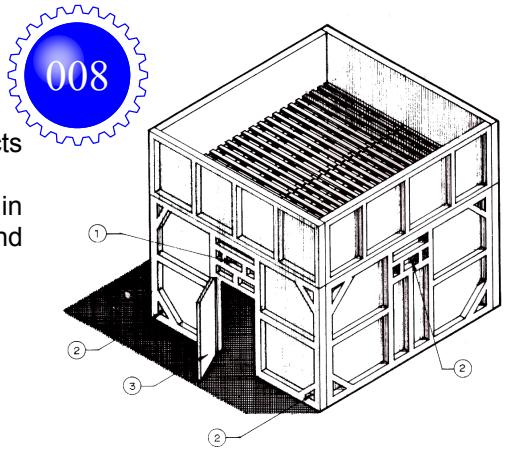
Los Baños Multi-crop Dryer (Collapsible Model)

DESCRIPTION

The Los Baños Multi-crop Dryer is low-cost copra dryer which can also be used for drying peanut, corn, coffee, cassava and fish. This technology makes night-time drying possible and is not hindered by drying-adverse weather conditions (e.g. rainy days). Furthermore, the machine does not require constant supervision.

FEATURES

- Low-cost
- Easy-to-use
- Uses waste products for fuel
- Applicable for use in both small farms and large plantations.



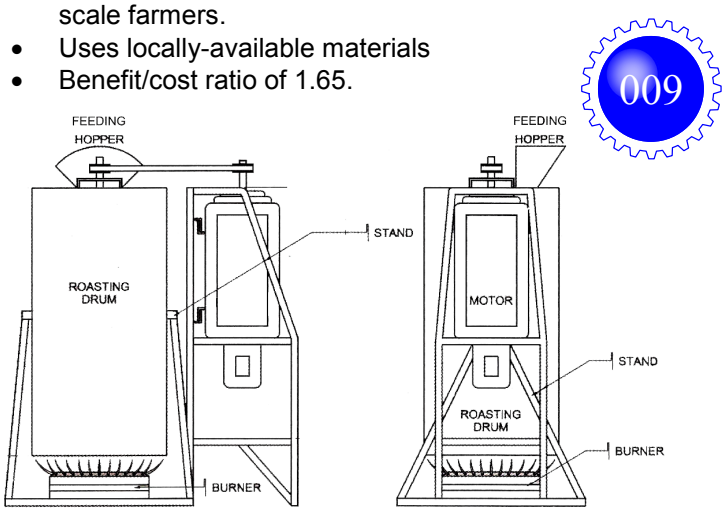
Small-Scale Mechanical Coffee Roaster

DESCRIPTION

The mechanical coffee roaster equipped with a microcontroller is a technology developed in response to small-scale coffee farmers' demand for an economical and efficient roasting machine. The microcontroller maintains and controls the temperature inside the roasting drum and the duration of roasting. The technology was developed in collaboration with the Agricultural and Food Engineering Department of Cavite State University.

FEATURES

- Optimum operating conditions are roasting temperature of 204°C, roasting time of 19.75 min, and initial moisture content of 12.25%
- Design capacity of 10 kg which is preferred by small-scale farmers.
- Uses locally-available materials
- Benefit/cost ratio of 1.65.



UPLB Flatbed Dryer

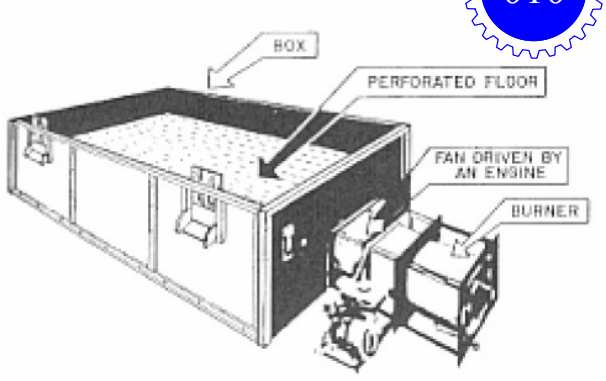
DESCRIPTION

The UPLB flatbed dryer is a low cost, compact, and portable dryer made from locally-available materials. It is easy to operate with little need for maintenance. It is made of three components: the bin to hold the grain on a perforated or lanced sheet metal, the burner or rice hull furnace to heat the air, and a fan to force the drying air.

010

FEATURES

- Can dry 40 cavans of paddy (14-26% moisture content) per batch in eight hours with uniform final moisture content.
- Automatic safety feature shuts off the burner which uses either kerosene at 1.5-2 L/hr or rice hull at 14 kg/hr.
- Powered by either a 3 hp electric motor or 5 hp gasoline engine.
- Grain floor of 2.38 mm diameter perforated steel sheet with 0.76 mm thickness.
- Airflow rate of 3,000 cfm through a 58-cm diameter fan.
- Fan and burner dimensions of 61x 69 x 69 cm
- Drying bin dimensions of 380 x 197 x 122 cm with 45 cm grain depth.



Analog Device for Monitoring and Regulating Gaseous Ammonia

DESCRIPTION

Gaseous ammonia within confined animal production facilities can be detrimental to the health of both workers and animals, ultimately having a negative effect on production economics. An analog device for measuring and controlling gaseous ammonia levels within confined animal production facilities was developed. The device consists of two primary circuits, the measurement circuit and the control circuit, contained on a single PCB. In regulating ammonia concentration levels, the device functions as a controller for activating and deactivating the actual control measure such as a ventilation system.

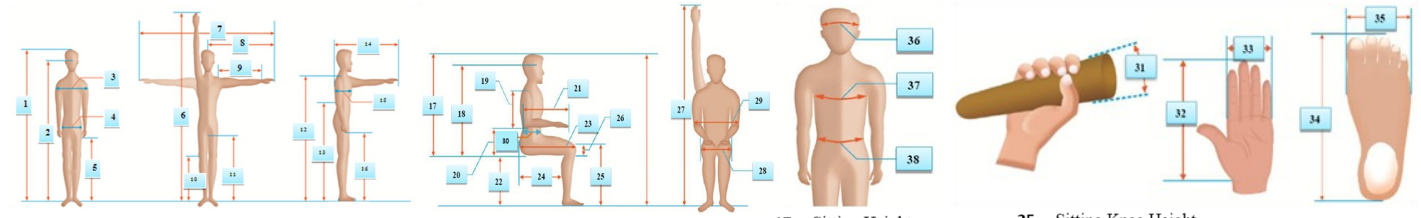
011

Anthropometric Profile Establishment for CALABARZON Farmers

DESCRIPTION

In the engineering profession, designing a machine or equipment that is safe and usable is one of the primary goals. A well designed machine should neither impose danger nor give discomfort to the user during operation. Guided by the principle of ergonomics, a designer or engineer must have enough anthropometric data of the users' physique that would limit the design and would serve as boundaries of the system. Thirty eight (38) different body dimensions that have direct bearing on agricultural machine design were collected from male and female farmers in the predominantly farming areas in CALABARZON region. Measurements were taken using standard measurements posture: standing erect and sitting erect postures, with body joints at 0, 90, and 180 degrees.

012



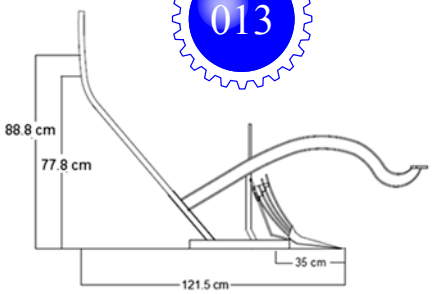
1	Standing Height	7	Total Span	13	Standing Elbow Height	17	Sitting Height	25	Sitting Knee Height
2	Standing Eye Height	8	Sideways Reach	14	Forward Reach	18	Eye Height above Seat	26	Thigh Clearance
3	Standing Shoulder Breadth	9	Arm Length	15	Chest Depth	19	Shoulder-Elbow Length	27	Sitting Upward Reach
4	Standing Hip Breadth	10	Standing Knee Height	16	Knuckle Height	20	Elbow Height above Seat	28	Sitting Hip Breadth
5	Fingertip Height	11	Crotch Height			21	Forearm-Hand Length	29	Breadth across Elbow
6	Standing Upward Reach	12	Standing Shoulder Height			22	Seat Height	30	Belly Depth
						23	Buttock-Knee Length	31	Grip Diameter
						24	Buttock-Popliteal Length	32	Hand Length
								33	Hand Breadth
								34	Foot Length
								35	Foot Breadth
								36	Head Circumference
								37	Chest Girth
								38	Waist Girth

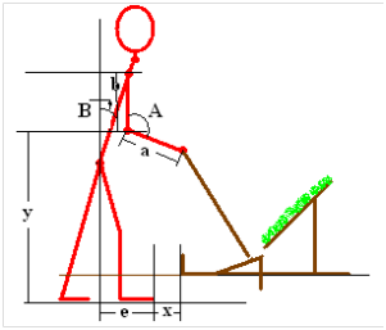
Anthropometric Profile Application for Female Farmers in CALABARZON

DESCRIPTION

A survey was conducted to develop an anthropometric data and working profile of female farmers in CALABARZON. The involvement of the female farmers in the agricultural production system was identified. Thirty-eight body parts were measured and these parts served as basis in evaluating some tools and equipment used by female farmers. Animal-drawn moldboard plow and IRRI 4-Row Ultralite Transplanter were analyzed using the anthropometric profiles collected.

013



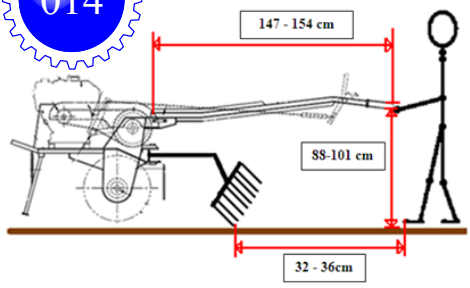


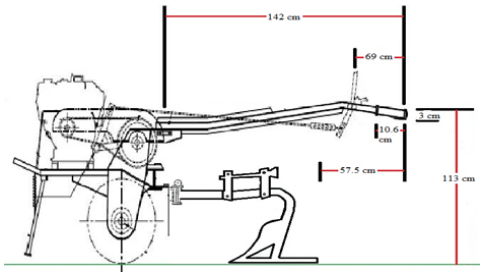
Anthropometric Profile Application for Male Farmers in CALABARZON

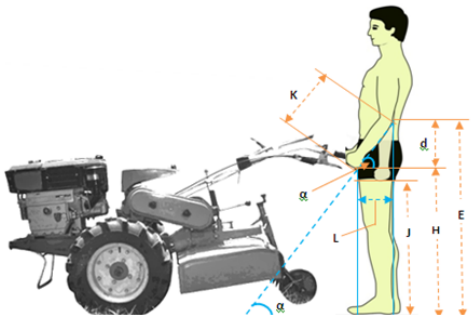
DESCRIPTION

The anthropometric profile of male farmers in CALABARZON was used in analyzing some machines used in farming. Different types of two-wheel tractors were analyzed to determine the fitness of the machine to its local user.

014





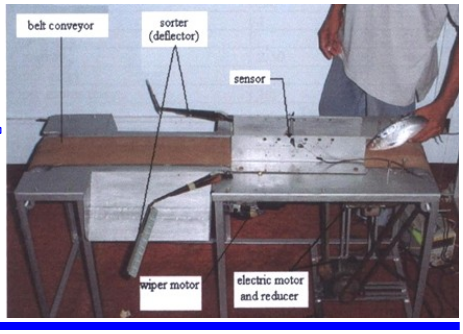


Computer-interfaced Milkfish Sorter

DESCRIPTION

The sorter was composed of the conveying unit, sensor or sizing device, and sorting mechanism. A motor-driven belt conveyor with known constant speed was used to convey the milkfish from the sensor to the sorter. The sizing was done through the use of an electromechanical sensor. The milkfish sorter has a sorting efficiency of 89% and a sorting capacity of 24 milkfish/min at 33.2 cm/s conveyor speed.

015



Computer-interfaced Photoelectric Mango Sizer

DESCRIPTION

A photoelectric sizer was designed and fabricated to allow the grading of different sizes of mangoes. The sensor was composed of three sets of LED and photocells. The sorting program to interpret data received was written in Turbo C. A suitable conveyor was also fabricated to mount the sensors on so that the mangoes could pass between the LEDs and the photocells. The sizing efficiency of the system is 84.28% for small, 91.43% for medium, and 95.71% for large.

016

> Any sufficiently advanced technology is indistinguishable from magic.
>
> — Arthur C. Clarke

Cone Penetrometer with Electronic Sensor

DESCRIPTION

A cone penetrometer was fabricated with the use of an existing strain gauge load cell as sensor. The load cell was connected to an INA122P DIP amplifier circuit and to a digital multimeter for readout. Calibration results revealed that the load cell and the circuit have very high linearity (R^2> 0.99) and low average hysteresis (less than 1.06%), which prompted the derivation of an equation relating the voltage output of the circuit and soil penetration resistance.

017

Fluidyne Pump

DESCRIPTION

A fluidyne is a type of Stirling engine with liquid pistons which utilizes the expansion and contraction of a gas when heated and cooled to lift water. Being an external combustion engine, it can be powered by utilizing heat coming from combustion of biomass or from solar radiation. Performance tests showed that the fluidyne had an average water delivery of 460 L/h at a pumping height of 2 m.

018

Jeepney-mounted Micro Windmill

DESCRIPTION

The optimum turbine design of the micro windmill, 80 cm diameter and 7.1 cm chord length, was mounted on the roof of a passenger jeepney. The micro windmill was designed as lift type windmill to minimize the possible drag component. When installed on the jeepney, the system has an overall height of around 3.45 m. The turbine of the micro windmill was connected to an alternator to convert the mechanical energy produced from the kinetic energy of the wind into electrical energy. The power output of the alternator that would start charging the battery ranged from 24 to 460 W and happened between 60 to 71% of the total travelling time of the jeepney.

019

Low-cost Flat-plate Solar Heat Collector

DESCRIPTION

A low-cost solar heat collector was fabricated using locally available materials. The performance of the fabricated collector is at par with commercially available collector having a fin efficiency of 0.957, collector efficiency factor of 0.953, thermal efficiency of 17.38, and overall heat loss of 6.25W/m^2. The fabricated flat plate solar heat collector was found out to be more economical than commercially available collector with a payback period of 1.23 years.

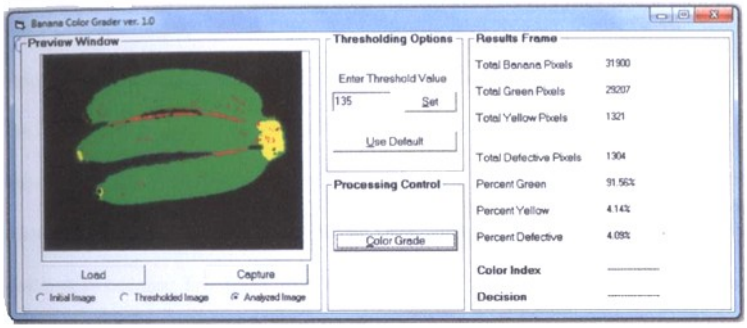
020

Machine Vision: Color Grading of Cavendish Banana Clusters

DESCRIPTION

A machine vision system, composed of a digital video camera recorder, a light chamber, a personal computer, and software named Banana Color Grader was designed for color grading of Cavendish banana clusters. The developed software has 98.88% precision in determining the amount of banana pixels in any loading orientation and 85% accuracy for color index determination. In determining the acceptability of banana clusters for export, the software has 93.33% accuracy.

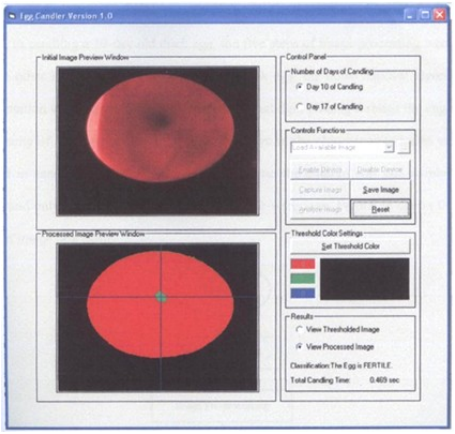
021



Machine Vision: Duck Egg Fertility Determination

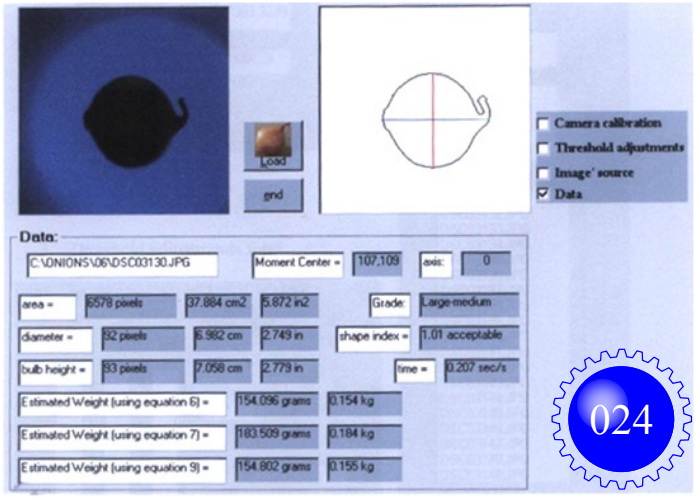
DESCRIPTION

A machine vision system, composed of a digital video camera recorder, a light chamber, a personal computer, and software for determining duck egg fertility was developed and tested. The developed software has 99.4% precision in measuring the size of the egg and a 100% accuracy in classifying the fertility of a 17-day old duck egg.



022

Machine Vision: Onion Classifier



024

Machine Vision: Size Grading of Banana

DESCRIPTION

A machine vision system capable of grading bananas according to size was developed. The software has the capability of processing banana images captured in a lighting chamber. It determines the length and diameter of the banana to evaluate its size. The capacity of the system is roughly 465,000 bananas per hour with accuracy of 93% in size grading.

025

Machine Vision: Grading of Milled Rice

DESCRIPTION

A machine vision system (MVS), composed of a flatbed scanner, computer, and software for grading of milled rice was developed and tested. Three varieties of rice (Fancy, R-18, and Sinandomeng) were subjected to grain length and width measurement, grain type, grain configuration, head rice count, paddy kernel count, percent head rice, percent brokens, and percent foreign materials using the MVS and manual method. The MVS took 55.25 seconds to load, scan, grade, and unload a milled rice sample and was about 15 times faster than manual method.

023

DESCRIPTION

A machine vision system capable of classifying onions according to size and shape was developed. The system was able to determine onion's correct angle of orientation. Sizing accuracy of the system is 96.7%, shape evaluation is 100%, and weight estimation is 95.0% accurate. The system took an average of 0.2 seconds load, analyze and display results.

Mango Pulper

026

DESCRIPTION

A mango pulper with high unbroken seed recovery was fabricated. The pulper was composed of two ribbed frustum cones that served as the pulping mechanism. It has a pulping capacity ranging from 0.32 to 1.8 tons/h at an efficiency ranging from 53.33% to 67.59%. The pulper has an unbroken seed recovery ranging from 71.43% to 100%.

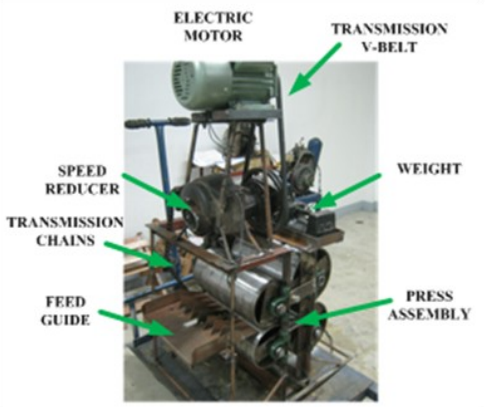
Mechanical Mungbean Sheller

DESCRIPTION

A mechanical mungbean sheller prototype was fabricated to address the need of small scale mungbean producing areas of a low capacity mungbean sheller. The sheller is made of locally available materials and powered by a 1-hp electric motor. The sheller performed best using dried mungbean pods (~10.7 %MCwb). The highest shelling efficiency was 98.8% with a shelling recovery of 96.6%. The shelling capacity ranged from 33 kg/hr to 39 kg/hr. The output purity was 97.3% while kernel damage was estimated at 5.9%. The material cost for fabricating the sheller amounted to Php 7500.

027

Pandan Leaf Flattener



DESCRIPTION

The Pandan Leaf Flattener simplifies the task of producing pliable pandan leaves before it can be weaved. The purpose of flattening is to make the pandan leaves pliable. The flattener is composed of three principal components: two-stage press assembly, power and transmission assembly, and feed guide. The pandan flattener's overall dimensions were: 500 mm x 625 mm x 1200mm. The operational peripheral speed was measured at 0.33 m/s. The volumetric capacity of the flattener's roller was computed to be 19.7 kg. This provides 573 N/m of force along the 331 mm long cylinder. The throughput capacity of the flattener design is 83.48 kg/hr.

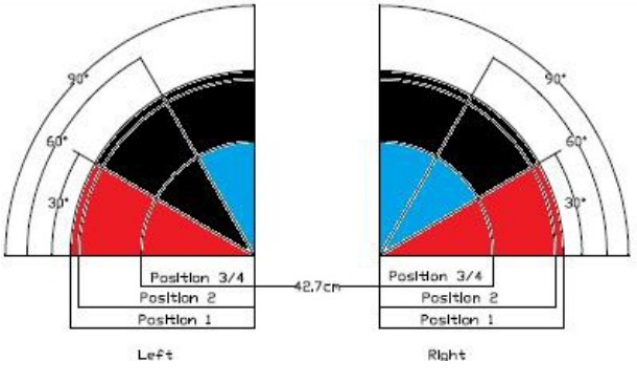
028

Reach Envelope of CALABARZON Male Farmers

DESCRIPTION

This study established the sitting position reach envelope of CALABARZON male farmers. The minimum, average, and maximum reaches without flexion are 63.8 cm, 69.6 cm, and 75.4 cm, respectively. The comfortable reach envelope was established and validated by a qualitative survey. Analysis revealed that the most comfortable reach envelope for both left and right hands is the region 38.6 cm to 62.7 cm between 30 to 90 degrees reckoned from sideward reach position.

029



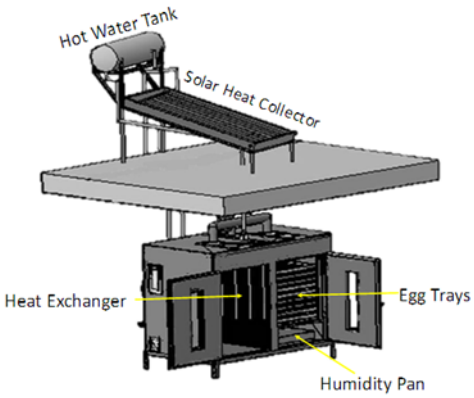
Serpentine-type Flat-plate Solar Heat Collector

DESCRIPTION

A serpentine-type flat-plate collector was designed and fabricated using locally available materials. Its generated water temperature had reached around 73°C with a thermal efficiency of 37.5 %. The absorber plate and the flow tubes (left) and the flat-plate collector painted with high-temperature black paint (right) are shown.

030

SINAG: An Energy Efficient Egg Incubation System



DESCRIPTION

The term **SINAG** is an acronym for **S**olar **IN**cubation for **AG**ricultural applications, which in Filipino means sun's ray; implying its utilization of solar energy. The main strategies implemented in the SINAG system to enhance energy efficiency were solar assisted heating of the incubation space and intermittent operation of the ventilation device. The study revealed that 72.6% of electrical energy could be conserved by using the SINAG system. The SINAG system promotes energy efficiency, utilizes a renewable energy resource, and can also be considered an environmentally sound technology. This study presents tremendous potential for adoption not just for *balut* production but also for the entire poultry industry.

031

AMDP FC10-2000 MF Forage Chopper

DESCRIPTION

The forage chopper is equipped with cutting blades made of high quality steel for longer service life. It has a mechanical feeder and a belt conveyor for easy and safe feeding of forage materials. The forage materials are laid on the conveyor; the mechanical feeder controls the feeding of the materials to obtain a uniform length of cut.

FEATURES

- Can cut different forage materials and agricultural resides such as napier grass, rice straw, corn stover, sugar cane stalks, water lily
- All steel heavy-duty materials
- With mechanical feeder for uniform length of cut
- With belt conveyor for easy and safe feeding of forage materials
- High carbon steel blades for longer durability and clean cut of chopped forage

032

Alternative Cold Room / Storage

DESCRIPTION

The cold room/storage is made up of plywood and polystyrene. The polystyrene is sandwiched between plywood. The collapsible model can be easily assembled and disassembled for easy transport. An evaporative cooling system was installed comprising of a cooling pad and an exhaust fan. Initial test conducted using tomatoes as samples, showed that it can increase the relative humidity by an average of 20% and decrease the temperature by 4.6%. These resulted to a reduction of moisture loss of tomatoes by as much as 4.9% per day.

033

AMDP Manual Corn Sheller

FEATURES

- Light and simple in construction
- Inexpensive
- Constructed from locally available materials
- Can be used for different sizes of

034

AMDP Sharp-crested Manual Weeder

DESCRIPTION

For pull-type version, the serrated cutting piece is placed flat on the ground. Handle is then pulled while maintaining cutting piece flat on the ground with serrated part cutting through and under weeds. For push-type version, same position prior to weeding is followed.

The implement then would be pushed with serrated part cutting through and under weeds. Weeding with the use of this implement is most effective for weeds at 2 to 3 leaf stage or when weeding is done 4 to 7 days after planting. With the light weight of the implement it can be made to work as close to plants as possible.

FEATURES

- Light and simple in construction
- Inexpensive
- Constructed from locally available materials
- Can be made to work very close to plants

035

Animal-drawn Plow-mounted Corn Seeder

FEATURES

- Cell-type metering device made of engineering plastic
- In-row hill spacing can be adjusted by means of sprocket combination between GW and metering device
- Number of seeds per hill: 1-3 seeds
- Slight modification of mounting to fit any type of carabao-drawn-plow

036

Cassava Lifter

FEATURES

- The UPLB cassava lifter is a manually operated second lever type implement
- Simple in construction, made of steel and with no moving parts for easy maintenance.
- The tool is equipped with a gripping device to lift the tubers and digger for retrieving tubers that are left in the ground
- With a capacity of 3 to 5 hills per minute

037

Fertilizer Metering Roller

DESCRIPTION

- This is a fertilizer meter that utilizes a horizontal fluted roller.
- Rate adjustment is achieved by changing the effective length of the flutes.
- The flutes have rounded bottom and are sufficiently wide to minimize adhesion of fertilizer to the surfaces.
- Plastic and stainless steel materials are used for resistance to corrosion.

038

Hand Jabber

039

FEATURES

- Can be used to plant various upland crops (seeds) both in zero tillage and cultivated soil condition
- Simple design and constructed from locally available materials
- Minimal maintenance and easy to use
- Needs little practice to be skillful in its operation
- Reduces drudgery compared to the traditional manual planting.

Horizontal Mixer

DESCRIPTION

The horizontal mixer utilizes a rotating shaft studded with pegs arranged in double helix form. Either dry or wet materials can be easily mixed continuously. This machine is highly recommended for feed and organic fertilizer production.

040

FEATURES

- Low cost technology
- Easy to operate
- Low maintenance cost and labor requirement
- Can mix various materials

Inclined Plate Seed Metering Device

DESCRIPTION

042

- This is a cell type seed meter that is fitted with an inclined plate for planting machines.
- It has a brush type seed ejector that reduces missed hills.
- It also has a seed tumbler for reducing doubles or multiples, which improves singling of seeds.
- A set of plates could be fabricated for different varieties and kinds of seed.

Hydraulic Water Ram

APPLICATIONS

As water supply for vegetable farms, orchards, livestock farms, households, small communities; supplemental irrigation for rice and other field crops.

041

FEATURES

- Gravity-operated, uses no fuel or electricity
- Practically maintenance-free (has only two moving parts)
- Easy to construct
- Can operate 24 hours a day

Manual Jatropha Fruit Dehusker

FEATURES

- Manually operated
- Requires one to two operators
- A sieve separates the seeds from the husk
- Can dehusk mature green and yellow Jatropha fruits
- 50 to 80 kg seeds per hour capacity

043

Mechanical Rice Transplanter

FEATURES

- Transplants rice seedlings in rows
- Uses less seedlings
- High field performance
- Easy to operate and maintain
- Low maintenance cost
- Low labor requirement

044

Modified Planet Junior Planter

045

FEATURES

- Push type planter
- With a seed plate installed suitable for corn
- Average spacing of 27cm
- Can plant 1 hectare in 7 hours at 75 cm row spacing
- Seed spacing can be changed by replacing sprockets or number of cells per seed plate
- Can be suited to other crops by changing seed plate
- Includes soil opener, soil closer and soil presser
- Can plant on flat or on furrows

Motor-driven Jatropha Fruit Dehusker

FEATURES

046

- Design capacity, one to two tons per hour
- Requires two to three operators
- A cleaning unit separates the seeds from the husk
- Can dehusk mature green and yellow Jatropha fruits
- Power requirement: 5 – 7 hp gasoline or diesel engine

Multi-crop Washer

DESCRIPTION

047

- The multi-crop washer is composed of a washing cylinder made of perforated sheet and a water holding tank
- It can be operated manually, by using an electric motor or a single cylinder engine
- The machine was evaluated using both power sources using cassava as the initial test material.
- Cleaning efficiency of 89.7%
- Peeling efficiency of 77.4%
- Washing-peeling capacity of 762.1 kg/hr

No-till Planter for Two-wheel Tractor

DESCRIPTION

048

This is a two-row planter with fertilizer for seeding corn after rice. The no-till or minimum tillage minimizes soil disturbance so that oxidation and loss of nutrients are minimized.

Oil Expeller

049

DESCRIPTION

The coconut oil expeller is a motor-driven extrusion-type machine capable of extracting oil from copra. It is suitable for extracting oil from cooked hammer milled copra utilizing a two-pass extraction process. The machine has provision for adjustment to regulate the degree of extraction and thickness of the copra cake. The machine consists of the hopper, screw press, heavy duty chain and sprocket drive and frame.

Pagpag Rice Thresher

DESCRIPTION

The "pagpag" rice thresher is made of steel. It is easy to operate. With threshing cylinder running at appropriate speed, materials to be threshed are fed into the threshing unit with panicles going in first. Mixture of chaff, straw and grain expelled from the machine are then manually separated by three or four persons with the aid of a winnowing bed. Grain collected beneath machine concave and winnowing bed are then cleaned with the use of a sieve and a blower.

FEATURES

- Light and portable
- Suitable for use during dry and wet seasons
- Compact and efficient design
- Easy to operate
- Can be constructed at minimal cost

050

Pneumatic Planter

DESCRIPTION

- This is a two-row seeder that may be mounted to a four-wheel tractor.
- Seed metering is achieved by utilizing vacuum.
- It is usable for corn, white bean and soybean.
- Accessories include furrower and fertilizer applicator.

051

Prototype Power Tiller with Gear Selector

DESCRIPTION

Compared with single speed, belt driven, locally made two-wheel tractors, this prototype creates a high torque at low speed utilizing an engine as small as 5 hp. Use of low gear creates sufficient draft and helps achieve deeper cut with single moldboard plows in upland field cultivation. It enables the tractor to be operated at the rated power of engines, and therefore, higher efficiency when preparing land. High gear and faster speed may be used for pulling a trailer. The tractor is made from surplus automotive differentials such as two differentials and a transmission assembly.

052

Rice Drum Seeder

DESCRIPTION

Rice drum seeder is made of light gauge metal tubing. Pre-germinated rice seeds are dispersed uniformly in the field when pulled by operator. It places seeds in straight rows which enables farmers to use a weeder and apply fertilizer easily.

FEATURES

- Saves seeds compared to broadcasting
- Simple design
- Low power requirement
- Low cost
- Convenient adjustment of seeding rates

053

Soil Sterilizer

DESCRIPTION

The soil sterilizing machine, composed of an enclosed cylindrical heating chamber has a load capacity of around 60 kg. The main component of the machine is a cylinder which also serves as the heating chamber. Fuel such as wood, charcoal, coconut shell or corn cobs can be used for heating. The machine can be closed on all sides and is equipped with a chimney to maximize the heat transfer from the burning of fuel and to prevent smoke inhalation by the operator. The components of the fabricated sterilizing machine can be easily disassembled and assembled making the machine portable. A stirrer composed of round and flat bars as bolt-on pegs and paddles were installed inside the heating chamber for mixing the soil to attain uniform heating. For the easy turning of the stirrer, a simple power train system made up of chain and sprockets were utilized.

054

UPLB Hand-operated Peanut Sheller

DESCRIPTION

The machine is easy to operate. Prior to operation, the feed regulator is kept closed. Peanut pods are loaded into hopper until full. While cranking, the feed regulator is slowly opened to one-half opening. Cranking is continued at a speed of 40 to 50 rpm. Shelling is accomplished by shearing action between pods against rotating shelling drum, between pods and concave, and between pods. Peanut kernels together with the shells drop through concave slots and into discharge chute.

FEATURES

- Easy to operate
- Accommodates different sizes of peanuts
- High shelling efficiency
- Portable, can be carried by one person
- Can be converted to pedal drive
- Simple in construction, can be fabricated using locally available materials at minimal cost

055

UPLB Hand Tractor

DESCRIPTION

The UPLB hand tractor is simple in construction and is durable. It utilizes two surplus automotive differentials to effect necessary speed reduction and power transmission. With its improved power transmission system, the UPLB hand tractor can utilize lower-power engines than the existing local hand tractors.

FEATURES

- High transmission efficiency
- Durable
- Can be operated both in dry land and lowland conditions
- Easy to operate and compatible with different tillage implements

056

UPLB Hand Tractor with Steering Clutch

FEATURES

- The steering mechanism is simple in design and can be fabricated by ordinary machine shops
- Made of locally available fabrication materials
- Affordable
- Durable
- Can be operated in stony field condition
- Easy to maneuver due to the presence of steering mechanism

057

UPLB Hand Tractor Model: Mini

FEATURES

- Simple, easy to fabricate and is made of locally available materials
- Can be used as a garden tractor due to its compactness
- The machine can likewise be used inside the greenhouse especially in doing primary and secondary tillage operations
- Very light
- very light that even women can easily operate the machine
- the machine is very easy to maneuver especially in rolling or hilly terrains
- Affordable and cheap as compared to imported hand tractors

058

UPLB Pedal Thresher

DESCRIPTION

The machine is pedal-operated by a bicycle chain-and-sprocket to transmit power from the human leg to the threshing drum. The drum must have a rotational speed of 200 rpm for effective threshing.

It is a hold-on-type thresher wherein grains are stripped by impact of the wire loops attached to the threshing drum. Hence, threshing can be done even if the paddy is wet.

059

FEATURES

- Easily transported from one farm to another
- Has steel frame and canvas which reduces the weight and cost of the machine

UPLB Single-row Organic Fertilizer Applicator

FEATURES

- Made of locally available materials
- Two-wheel tractor-drawn single-row fertilizer distributor
- The fertilizer applicator consists of the following components:
- hopper, metering device, power transmission and ground wheel
- With positive displacement metering device
- With adjustable metering rate
- With furrow opener

060

UPLB Two-drum Corn Sheller

DESCRIPTION

Corn ears are loaded into the hopper and are allowed to enter the shelling assembly. Corn ears are reloaded into the hopper when half of the capacity has been shelled.

FEATURES

- Constructed from locally available materials
- Non-crushing type (shelled cobs are kept whole)
- Versatile (can shell corn for seed purposes)
- Suitable for all sizes of corn ears

061

Village-level Ethanol Production System

062

DESCRIPTION

This technology would offer the rural livelihoods an accessible and dependable source of energy and fuel. Ethanol can be used as fuel to slightly modified gasoline engines which when coupled to generator would provide electricity for lighting. It could also be readily fueled into modified engine to serve as power source for power tiller, irrigation pump, thresher and other agricultural machines and implements needing power.

FEATURES

- Utilizes a technology that is simple, practical and efficient
- The distilling apparatus is portable and easy to assemble
- Low cost and easy to fabricate using locally available materials
- The apparatus can distill fermentation broth (beer) from different feedstocks such as starchy materials (corn, cassava, sakwa), saccharine materials (sugarcane, molasses, fruits) and coconut toddy (tuba)
- Easy and safe to operate

Windmill (Savonius Type)

FEATURES

- The windmill is easy to fabricate, and can be made by machinery manufacturers which possess only the basic shop equipment
- It can use blades which can be uniform and untwisted, and without the need of the airfoil shape
- It has low rotation speed, which makes the system ideal for ideal for piston-type water pumps
- Have higher torque which makes it very applicable for water pump operation.

063

Visual Image / Digital Image Analysis

DESCRIPTION

In digital image analysis, an altered image is not a new image but a classification from the image itself. To measure the area and length dimension from a raw image, pixels are the basis. Digital image processing employs computer algorithms to perform digital image processing and manipulation using color recognition and light deflection. Two-dimensional images are sufficient for a comprehensive analysis. Mathematical models were developed to rapidly estimate the live weight of dairy buffalo using visual image analysis (VIA). It is also being used to estimate the leaf area index.

064

FEATURES

- Reduces the stress of both plants and animals in estimating its leaf size, body size and weight, respectively.
- The software used is user-friendly.
- Procedures in conducting image analysis is easy to follow.

G.I.S. Application in Agrometeorology

DESCRIPTION

Geographic Information System (GIS) is a information system with a powerful set of tools for collecting, storing, retrieving, analyzing, synthesizing and displaying geographically referenced data. In essence GIS is a technology which is compose of hardware and software tools use for collecting, storing, retrieving, analyzing, synthesizing and displaying geographically referenced data. It is also an information handling strategy, which can handle large database system. The main objective of a GIS is to improve overall decision making.

065

FEATURES

- GIS provides the framework to acquire, develop, and interpret the complex spatial and tabular data sets.
- GIS is helping development and conservation communities find common ground by providing a framework for the analysis and discussion of resource management issues.
- GIS organizes all kinds of data from census data, zoning, and tax assessment maps to digital aerial photographs and satellite images, providing public access to information that previously was difficult to use.

Technology *is the making, modification, usage, and knowledge of tools, machines, techniques, crafts, systems, methods of organization, in order to solve a problem, improve a preexisting solution to a problem, achieve a goal or perform a specific function. It can also refer to the collection of such tools, machinery, modifications, arrangements and procedures.*

Grass Hydroponics System

DESCRIPTION

A small-scale hydroponic system using nutrient film technique (NFT) was developed for growth optimization studies of corn as forage for cross bred dairy buffaloes. Green fodders are germinated in hydroponic units using corn as a common seed source. All plant matter including roots, seeds and foliage are fed to animals. It was found out that fodders grown hydroponically has an appreciable increase in protein, Vitamin A, B complex, C and E.

066

FEATURES

- Production of animal feed is about half the cost of that produced conventionally.
- The cost of pesticides, fertilizers, machinery for cultivation and harvesting costs 10 times lesser.
- All year-round supply of grass for the animals.
- Easy to construct.

Nutrient Film Technique (NFT) System for Plant Cultivation

DESCRIPTION

The nutrient film technique (NFT) of cultivating crops under a controlled environment is a new scheme for the Filipino farmer. The production of lettuce and tomatoes can increase by almost three times by increasing crop density. The division developed a modular low-cost (commercially viable) "DO-IT-YOURSELF" kit of an NFT system for tomato, lettuce, and ornamental crops production. The loading characteristics of the system will be established quantitatively to the extent possible.

FEATURES

- High yield because of a proper root environment and good nutrients.
- Considerable reduction in the amount of water supply with the reduced soil evaporation and seepage.
- Balanced nutrient solution through accurate control of the homogenous nutrient solution.
- Reduction in the total amount of surface area for the roots.
- Opportunity for growing local crops where normal cultivation is difficult.
- Reduced labor requirement.

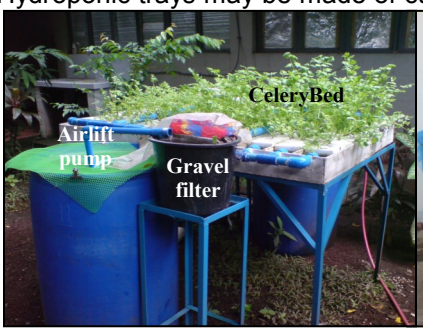
067

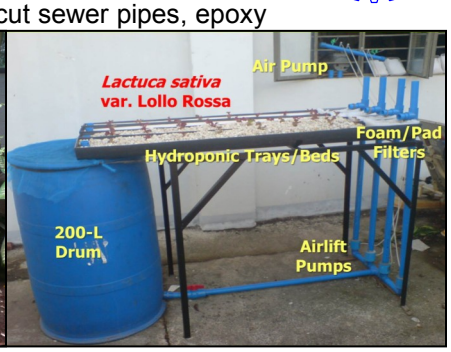
Backyard-scale Airlift Aquaponics System

DESCRIPTION

The aquaponics system is an integration of fish culture with hydroponics or soil-less plant culture. Gravel or pebble serves as biofilter that convert fish wastes to nutrients for plants like lettuce and celery, and the filter and plants together maintain the water quality to suitable levels for fish growth. Air, supplied by two 6-watts or bigger sized aquarium air pumps, is not only used to oxygenate but also to pump and circulate water through airlift pumps. Hydroponic trays may be made of cut sewer pipes, epoxy -painted or lined plywood, and many other materials. The 200-L backyard system can support 75 pcs tilapia that may be harvestable in 4 months or more depending on desired size, and vegetables may be grown to harvestable size in about 20-40 days depending on the size of fish and amount of feed provided. Fish and vegetables may be totally or partially harvested at desired sizes, and may be replaced with new stock.

068





Improvised System for Measuring Contaminant Transport in Soils

069

DESCRIPTION

An improvised system for measuring contaminant transport in soils was developed through a DA-BAR-funded project. The system is capable of generating breakthrough curve data for laboratory soil columns under saturated conditions at constant head using either a pulse input or continuous input of contaminant. This technology is important in generating data for contaminant transport modeling purposes.

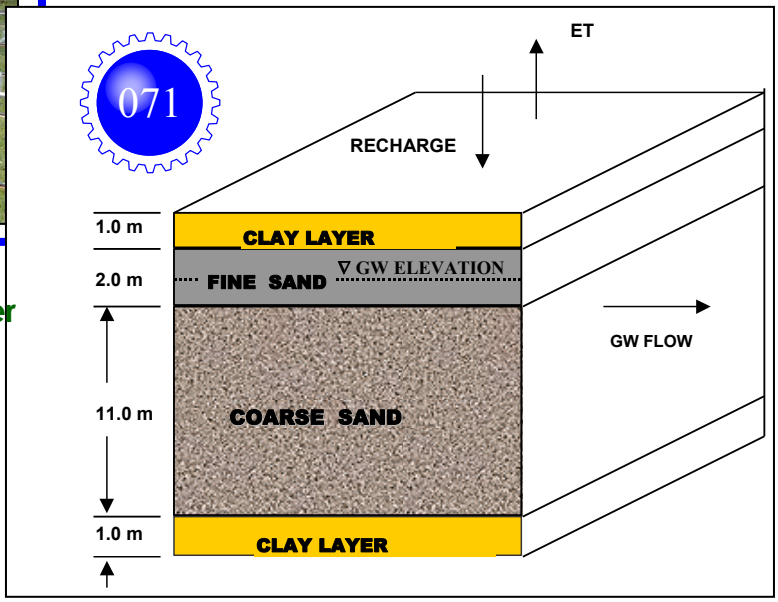
070

Improvised System for Testing Low-cost Drip Irrigation Performance

DESCRIPTION

An improvised system for testing the water distribution uniformity of a low-cost drip irrigation system at various operating heads and slopes was developed through the USAID-funded SANREM project. The system is capable of setting desired average operating heads for specified submain slopes through the use of an improvised manometer. The water distribution uniformity can consequently be determined through volumetric measurements. This technology can generate optimum operating pressure heads prior to installation of the low-cost drip irrigation in upland sloping areas.

071



Three-dimensional Numerical Groundwater Model for Sustainable Shallow Aquifer Management in the Philippines

DESCRIPTION

A three-dimensional numerical groundwater model based on USGS-MODFLOW was developed by V.B. Ella for a typical shallow aquifer in the Philippines through the UPLB Basic Research Program. The model is capable of simulating shallow tubewell drawdown under multiple pumping scenarios. It can also generate optimum spacing between shallow tubewells to minimize well interference.

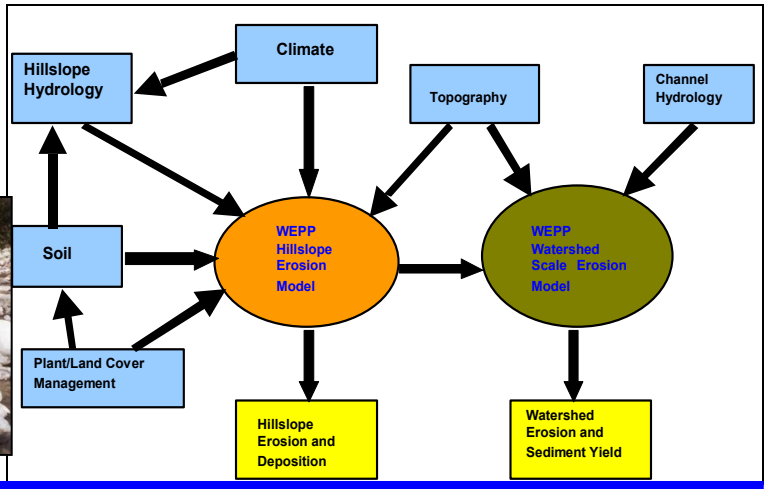
$$\frac{\partial}{\partial x}\left(K_x \frac{\partial h(t)}{\partial x}\right)+\frac{\partial}{\partial y}\left(K_y \frac{\partial h(t)}{\partial y}\right)+\frac{\partial}{\partial z}\left(K_z \frac{\partial h(t)}{\partial z}\right)+Re(t)-ET(t)=S_s \frac{\partial h(t)}{\partial t}$$

Watershed-scale Soil Erosion Model for Analyzing Land Use Change Effects

DESCRIPTION

A soil erosion model based on WEPP was developed by V.B. Ella for a typical small upland watershed in the Philippines through the USAID-funded SANREM project. The model is capable of predicting soil erosion and sediment yield on a watershed-scale under varying land use scenarios.

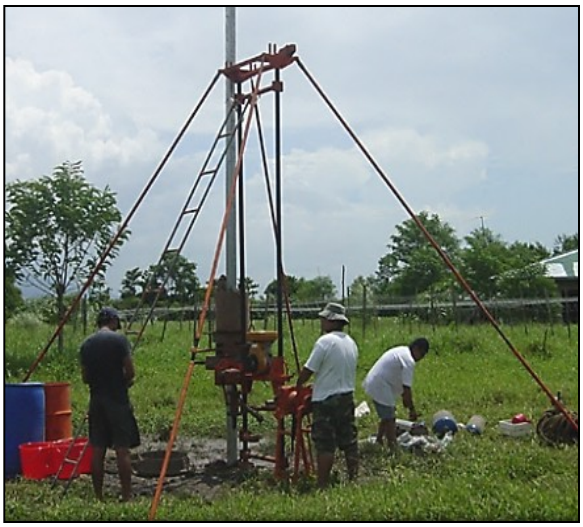
072



DA-UPLB Drilling Rig Model II

DESCRIPTION

The DA-UPLB Drilling Rig Model II is an improved version of the DA-UPLB Drilling Rig Model I and a down-sized version of the expensive truck-mounted drilling rig but a more mechanized and efficient version of a typical local drillers' "make-shift rig". Less sophisticated and smaller in size, it could be fabricated by machine shops in almost every province in the country.



FEATURES

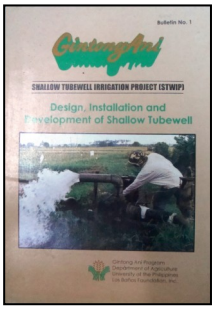
- Affordable
- User-friendly—can be safely set-up, operated and dismantled with ease by three persons
- Highly portable
- Adaptable to uneven terrain
- Capable of whole pipe length hammering
- Allows more flexibility in pipe hammering

073

Shallow Tubewell Technology

DESCRIPTION

A shallow tubewell (STW) is a tube or shaft vertically set into the ground for the purpose of bringing groundwater to the soil surface. It is usually set at a depth of less than 20 m and extracts water from groundwater storage by suction lifting. Methods of installing STWs vary from a more expensive use of gravel packing to the simple driving of an unperforated pipe onto the ground without sufficient well development. The method of installing STWs in confined aquifer developed in partnership with the Department of Agriculture (DA) is cheaper as it avoids the use of gravel pack, and it employs scientific approach to well logging, well design and pipe installation and well development, thus ensuring a higher chance of optimal performance. This practical guidelines on STW design, drilling/installation and development was released as DA-UPLBFI STWIP Bulletin No.1 in 2001 by the Agricultural Information Division of the DA.



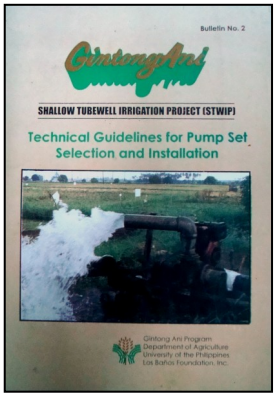
074

Pump Set Selection and Installation

DESCRIPTION

Shallow tubewells (STWs) for irrigation are usually equipped with centrifugal pumps which are driven by single cylinder diesel engines. An STW pump and its prime mover should be carefully matched so that water is pumped efficiently and at minimum cost. A pump and its prime mover are matched in terms of power ratings and shaft speeds. As most pumps are belt -driven, it is also important that appropriate pulley combinations are used for the proper matching of the pump and prime mover shaft speeds, and in order to transmit the required speed energy to the pump with minimum loss. These technical guidelines present the step-by-step procedure for selecting STW pumps and their primemovers, including the computations of irrigation water requirements, pump discharge and total dynamic head. The detailed procedure on the installation of pump set assembly is also discussed. These guidelines for pump set selection and installation was released as DA-UPLBFI STWIP Bulletin No.2 in 2001 by the Agricultural Information Division of the DA.

075

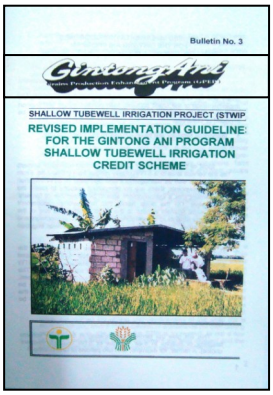


Revised Guideline for GAP STW Credit Scheme

DESCRIPTION

Under the Gintong Ani Program (GAP) credit scheme, each region should carry out public bidding for the installation of a targeted number of the "typical" shallow tubewell (STW) system. Well design, drilling and development as well as the provision of pumping unit are usually bidded as one single package. The winning bidder is usually a machinery dealer who will either subcontract the drilling and development of the wells or establishes his own drilling outfit. The practice of one winning bid, one type of pump and prime mover for one or more regions is also distorting the market supply and demand situation for the pumps and engines specified in the winning bids. This partly explains the high costs of such engines in comparison with the procurement prices at their country of origin. This guideline governing the implementation of the credit scheme, loan conditionality and support services after the turnover of the STWs to the farmers helps bring down the cost of STW irrigation development, protect farmers against well failures and poor quality pumping units, promote greater private sector and farmer's participation in STW irrigation development and encourage timely and full loan repayment.

076



Primer on STW Irrigation

DESCRIPTION

This primer provides information on shallow tubewells (STWs), the potentials of STW irrigation, the advantages of STW irrigation over national irrigations system (NIS) and communal irrigation system (CIS), and the reasons for the slow pace of STW irrigation development. The reformulated STW Irrigation Program was also presented to address the constraints to accelerating the pace of STW irrigation development.

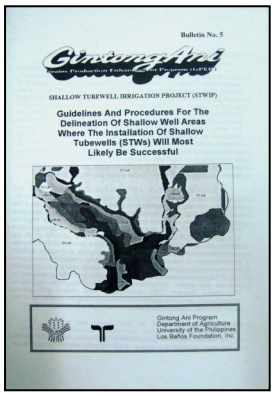
077

Guidelines for the Delineation of Shallow Well Areas

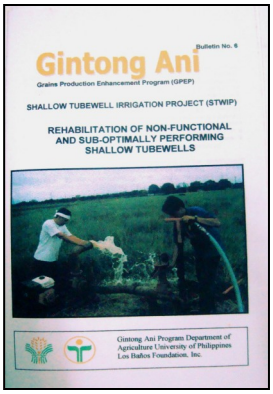
DESCRIPTION

One of the most important preliminary steps for a successful shallow tubewell (STW) development is the proper delineation of shallow well areas where STWs will most likely be successful. The lack of reliable information on the suitability of shallow well areas often results to either sub-optimal performance or system failure. Although a comprehensive shallow aquifer characterization program has been accorded top priority in the Comprehensive Irrigation Research and Development Umbrella Program (CIRDUP) launched by the DA, the accurate delineation / mapping and characterization of shallow aquifer systems in all the regions will take several years. Hence, these guidelines and procedures were formulated to provide rough but rapid way of delineating suitable shallow areas in the interim period before the more accurate outputs from CIRDUP become available. It is intended for use of Regional Agricultural Engineering Groups, LGU technicians, local drillers and private entrepreneurs and other parties concerned pending the availability of the more accurate baseline information.

078



Procedure in STW Rehabilitation

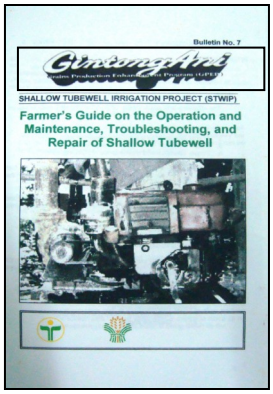


DESCRIPTION

Not a few shallow tubewells (STWs) installed under various government programs are non-functional or sub-optimally performing. It is, therefore, imperative that rehabilitation of non-functional or sub-optimally performing tubewells be granted high priority in order to sustain growth in the STW irrigated areas and maximize the benefits from STW irrigation development. This procedure starts with the diagnosis and solution of defects with the visible or above-ground aspects and components of STW. It is followed by investigating and solving possible faults in the well design, pipe installation and well development. STW rehabilitation may require further development of wells, resiting of poorly designed and installed wells or repair, reconditioning or replacement of non-functional components of pumping units. This procedure is intended as a guide for STW drillers, DA and LGU technicians and engineers.

079

Farmer's Guide on the O&M of STWs



DESCRIPTION

The efficiency and sustainability of a shallow tubewell (STW) irrigation system lies on the following factors: (1) proper selection of site, (2) proper design, drilling and developments of wells, (3) proper selection and installation of pumping unit, and (4) proper operation and maintenance of pumping units. While the government technicians could take major roles in the first three factors, the farmer-end users are ones left in-charge of the fourth factor. This guide will help the farmer-end users on the proper operation and maintenance of STW pumping units including their trouble shooting and repair. Included in this guide are the following: (1) list of centrifugal pump troubles including their causes and solutions, (2) list of diesel engine troubles including their causes and solutions, and (3) list of gasoline engine troubles including their causes and solutions.

080

Lightweight Concrete Using Volcanic Pumice and Polypropylene Pellets as Aggregates

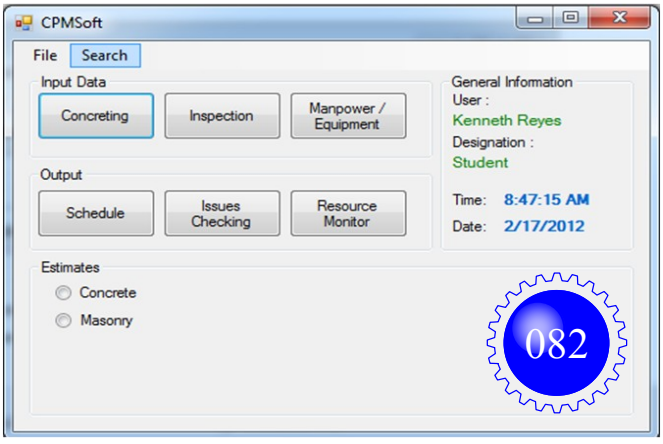
DESCRIPTION

The lightweight concrete composition were Type 1P cement, polypropylene pellets, ordinary river sand, volcanic pumice, and tap water. Generally, the concrete specimens produced are low-strength concretes. They can be used as interior partitions or dry walls, in low-weight-requirement paths such as pedestrian malls and sidewalks and as pavement fillers. This could significantly decrease the amount of materials and help in protecting the environment.

Project Management Software Focusing on Concrete and Masonry Estimate and Activity Tracking for Small-scale Construction

DESCRIPTION

The software or the CPMSoft was developed using Visual Basic.NET Express. Its main functions are to provide estimation tools, generate schedule, and keep records into database. It directly reduces the time consumed in browsing documents and waste generation from papers used as calculation of estimates. It mostly automates different tasks to aid an engineer.

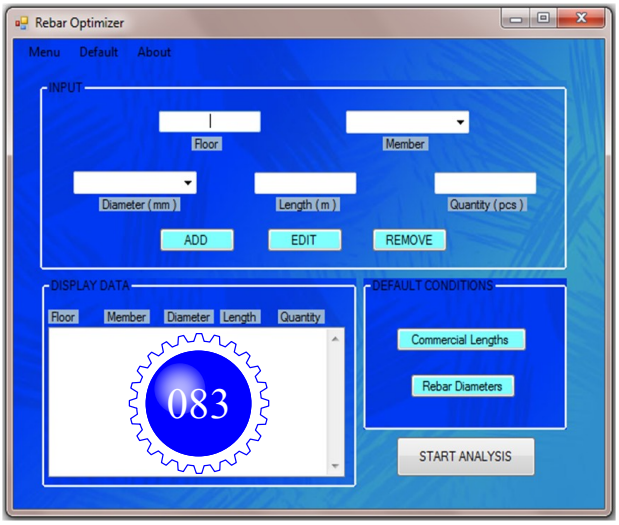


082

Rebar Scrap Weight Minimization Software

DESCRIPTION

The software was developed using a trial version of Microsoft Visual Basic 2010. The resulting software is limited only to the minimization of construction waste in terms of reinforcing bars. It was developed in such a way that it considers all possible rebar cut length combination before converting to commercial specifications.



Simplified Setup of Concrete Impermeability Apparatus

DESCRIPTION

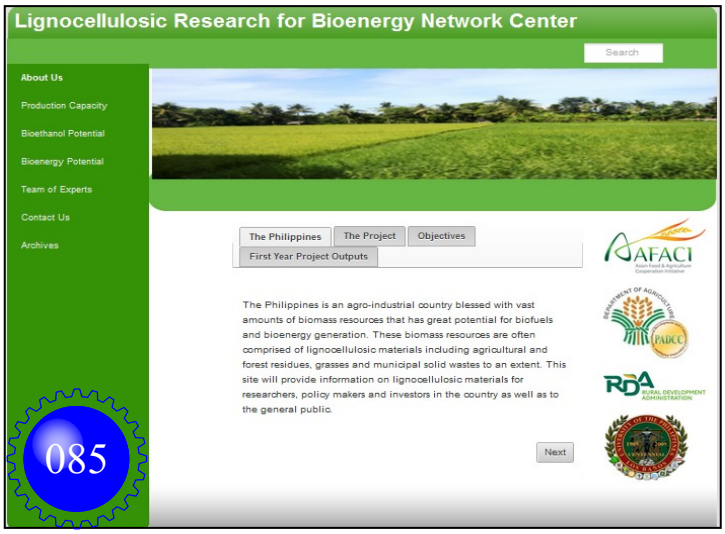
The set-up developed measures the penetration of water in concrete and for testing the permeability of concrete to determine the corrosion rate and other properties of concrete related to its strength and durability. The set-up is cheaper and easy to install compared to other concrete impermeability apparatus. Some limitations of using the simplified set-up are long testing time, need of daily monitoring, and limited magnitude of pressure.

084

Lignocellulosic Feedstock Databank

DESCRIPTION

The PADCC together with the researchers of the UPLB has been commissioned to provide a multi-criteria reference bank on fuel ethanol and energy potential of lignocellulosic resources in the Philippines in the form of an online database, made available to the scientific, agricultural, forestry and industrial communities and updated as the project progresses. The project enabled the modeling of the biomass growth of documented species and adaptation of cropping and silvicultural cycles to energy use. Its main aim is to generate mapping tools which can be applied to practical supply basins during studies prior to the implantation of industrial facilities. The feedstock considered were corn fiber, corn stover, rice straw, rice hull, softwood chips, hardwood chips, bagasse, giant reed, agricultural wastes and urban yard wastes.



Microalgae as Feedstock for Biodiesel Production

DESCRIPTION

In 2009, a DOST-PCAMRD-funded project ventured on the screening and mass propagation of freshwater microalgae to be dedicated for biodiesel production. From several criteria, *Chlorella vulgaris* is deemed to be feasible for large-scale cultivation. Vertical column photobioreactors were fabricated to initiate scaling up microalgal biomass production. High algal biomass productivity was obtained in outdoor conditions using alternative fertilizer media; this was regarded as a milestone for low-cost propagation of microalgae. Oil extraction from algal biomass was also studied through the use of chemical extraction processes using various organic solvents. Due to this breakthrough, two sets flat-plate PBRs were then constructed at the vicinity of Chemical Engineering Department. The lipid productivity was also examined and optimized considering the environmental and biotechnological factors which may affect the quality and quantity of the algal oil.

The recent achievement of the algal biofuel research in UPLB is the construction and preliminary testing of two 1000-L algal pond systems (multi-stage pond and raceway pond). With the funding of UPLB and DA -BAR, the current research aims to establish and optimize the processes and feasibility of microalgae for large-scale biodiesel production.

The constructed and existing medium-scale raceway pond and multi-stage system will be integrated with optimal harvesting and dewatering units in the future. The experiment site is now being evaluated based on the climatic conditions that are crucial for maximum algal production. The general geographical and climatic data of the site were considered in the conduct of parametric and optimization studies of such cultivation systems.

086

draft-tube vertical column photobioreactors

vertical flat-plate photobioreactor

vertical flat-plate photobioreactor

cultivation pond systems

raceway pond

Quality Syrup from Sweet Sorghum

DESCRIPTION

A pilot scale calandria-type evaporator and barometric countercurrent direct contact condenser were designed to produce quality sweet sorghum syrup. After the operation of the evaporation system is established, manuals of operation and production are provided. This set-up can produce the desired brix of syrup within four to five hours with continuous recycling (since it is only a single effect). The pilot plant for sweet sorghum syrup is composed of the following equipment: mill machine, calandria-type evaporator, barometric condenser, spray pond and boiler.

mill machine

087

evaporator


barometric condenser



spray pond


boiler

Pilot-scale Production of Biodiesel from *Jatropha curcas* Seeds

088

DESCRIPTION

In 2006, the Integrated R&D for Jatropha Biodiesel Production was started with funding from PNOC-AFC. The Chemical Engineering Department had numerous researches regarding oil extraction and processing of Jatropha oil to biodiesel. Optimum conditions were achieved with 98.66% purity of methy ester (biodiesel) using 1:6.89:0.2 oil-to-methanol-to-NaOH molar ratio, 30 minutes reaction time and 53.7° C reaction temperature. Subsequent researches tested petroleum ether efficiency as dispersal medium for NaOH-catalyzed methanolysis of Jatropha oil which concluded that by using a co-solvent or dispersal medium, transesterification reaction time was lowered significantly with less or no stirring required.

Due to the optimum data generated from the researches, village scale biodiesel production was also established. An oil expeller and 100-L continuous stirred tank reactors were designed and fabricated. Using the fabricated equipment, the Department was able to produce 1000-L of Jatropha biodiesel.

Optimization of Steam Explosion Parameters in the Pretreatment of Sweet Sorghum Bagasse for Bioethanol Production

089

DESCRIPTION

The study was a first attempt in the Philippines to utilize and optimize steam explosion technology for the pretreatment of sweet sorghum bagasse, as a first step toward the production of “second-generation” biofuel ethanol in the country. The extracted juice from the sweet sorghum stalk is fermented to ethanol, leaving large amounts of lignocellulosic residues (i.e. “wastes”) in the the form of bagasse.

The research adds value to the waste bagasse by converting it into biofuel ethanol. Thus, ethanol from both the juice and the bagasse of sweet sorghum was obtained, improving its sustainability as a biofuel feedstock. The focus of this research was the first step pretreatment process using steam explosion to deconstruct the lignocellulosic matrix in the bagassel. Steam explosion is considered one of the competitive methods for biomass pretreatment and is an active area of research in other countries. Using a statistical approach to optimization, the pretreatment conditions which maximized the release of potential sugars were determined.

The results of the study would hopefully provide impetus for pursuing further research toward an integrated technology for the use of sweet sorghum as a highly sustainable “national feedstock” for bioethanol production in the Philippines.

For a successful technology, reality must take precedence over public relations, for Nature cannot be fooled.

— Richard P. Feynman

Utilization of Sugarcane By-products and Agricultural Wastes

DESCRIPTION

Instead of going into the waste streams, by-products from sugarcane processing are utilized to become additional sources of income. Distillery slops have been used for ethanol and acetic acid fermentation with back-slopping. Distillery slops used for ethanol and acetic acid production and back-slopping will guarantee zero wastewater generation and reduction in water consumption.

The potential of distillery slops for generating biogas was also investigated. Distillery slops can be used as substrate to produce methane gas, which is a valuable substitute for fuel. The potential of using distillery slops as diluent in second dipping fish sauce (*patis*) production was also studied. It was found that distillery slops can definitely be used as diluents for fish sauce manufacture.

Filter cake, a waste product in raw sugar manufacture, was also studied to establish its potential as a feed component of broiler rations. The results showed that filter cake can be incorporated in broiler rations at a maximum dosage of 10% without significantly affecting the yield of chicken meat.

A study was also conducted to determine the potential of sugarcane trash as a source of organic fertilizer. Its effect on sugar cane yield was evaluated. Results on pilot scale showed that filter cake can be biodegraded to organic fertilizer under controlled moisture, temperature, carbon/nitrogen ratio and fineness of the material.

090

Trichoderma Protein Production from Cane Trash, Bagasse and Pith

DESCRIPTION

Sugarcane bagasse is the main source of fuel used in generating steam and power to run sugar factories. However, surplus bagasse may be used to produce other valuable products in order to increase the revenues of these factories.

A non-pathogenic strain of *Trichoderma viride* (requested from USDA) was cultivated in culture bottles. This fungal protein was subjected to quality evaluation by biological means. *Trichoderma* is a good protein source by virtue of its high protein content and good digestibility, coupled with other favorable factors: fast multiplication/cultivation, low space requirements and availability of raw materials.

091

Production and Application of Steam-activated Carbon from Philippine Sugarcane Bagasse

DESCRIPTION

Sugar factories with excess bagasse may earn more profits by producing activated carbon. Air-dried bagasse samples were carbonized for one hour in a reactor (3.5 cm OD x 19 cm L) inside a horizontal electric furnace at 300ºC with nitrogen gas pressure maintained at 0.5 kg/cm^2 and a flowrate of 100 cc/min, then the carbonized materials were activated for one hour at 800ºC using steam at 3720 cc/min. The higher values of Iodine Number (IN) and Biomass Iodine Number (BIN) of steam-activated samples showed that steam is a better activating agent that CO_2.

092

Evaluation of Oxidant Formation and Ammonia Destructionin Alkalinity-Supplemented Simulated Seawater in a Batch Electrolytic Reactor

DESCRIPTION

Ammonia, a by-product of nitrogen metabolism in shrimp aquaculture farms, is toxic to black tiger shrimp even at low concentrations. With the occurrence of devastating outbreaks of shrimp diseases which threaten export productivity in the Philippine shrimp aquaculture industry, the maintenance of good water quality is critical for strengthening of shrimp immunity against fatal shrimp pathogens. Electrolytic treatment has been found to be a sustainable method for removing ammonia in shrimp aquaculture farms, because it can be used in a closed-system, involving the recycle of spent aquaculture water. The mechanism involves the electrochemical generation of chlorine-based oxidants from the naturally-present chlorides in seawater, which in turn destroys the ammonia. The operation of such electrolytic reactors in shrimp farms has so far been partly empirical due the insufficient understanding of the relationships of operating current, oxidant formation and the kinetics of ammonia destruction in seawater conditions. This research was an attempt to quantify these relationships.

093

Removal of Chromium from a Local Chrome-Tannery Wastewater by Sodium Sulfite Reduction Coupled with Sodium Hydroxide Precipitation

DESCRIPTION

094

The study was conducted in response for a call to develop wastewater management strategies for reducing chromium pollution point sources in the Marilao-Meycauayan-Obando River System (MMORS). The technical feasibility for the removal of chromium from local chrome-tannery effluents was evaluated using a two-step process involving sulfite reduction and alkali precipitation. Sulfite reduction reduces the toxic hexavalent chromium (Cr VI) into the less harmful trivalent chromium (Cr III), and alkali addition converts the trivalent chromium into an insoluble hydroxide precipitate.

Selective Recovery of High-Purity Silver from Local Goldsmelting Wastewater

DESCRIPTION

The electrochemical recovery of silver from goldsmelting wastewater was investigated to improve the quality of the cathodic deposits (in terms of silver purity) in potentiostatic experiments. By introducing a more sustainable silver recovery method for these small to medium scale operators, metal point source solution from the use of traditional silver recovery methods (by copper replacement) can be greatly reduced. The improved electrolytic recovery method could also hopefully attain a higher purity of the silver.

Response Methodology (RSM) with numerical optimization was used to obtain an optimum operating voltage which can maximize both initial rate of silver removal (*i.e.* faster electrolysis time) and the silver-purity of the deposits. Scale-up and operation considerations, as well as preliminary cost estimates were also made, based on the charge dose. Results showed that low operating voltages could obtain a higher silver-purity in the cathodic deposits, but with a low initial silver-ion removal rate from solution (*i.e.* slower electrolysis time). On the other hand, higher operating voltages would result in a faster initial silver-ion removal rate, but lower quality of silver deposits.

095

Electrochemical Decolorization and Chemical Oxygen Demand (COD) Reduction of Colored-Manufacturing Wastewater

DESCRIPTION

The study explored the use of electrochemical oxidation (EOx) for the removal of color and COD (Chemical Oxygen Demand) from effluents of a local colored-paper manufacturing facility. The process is an Advanced Oxidation Process (AOP), which the recommended method for destroying recalcitrant/toxic organic compounds like color and its associated COD. The EOx process is based on the electrochemical generation of chlorine-based oxidants, which are then used for the destruction of non-biodegradable or partially bioegradable organic compounds.

The decolorization efficiency and chemical oxygen demand (COD) reduction was explored at different levels of constant operating current and NaCl supplementation. Increase in initial decolorization rate and COD reduction were observed with increasing operating current and level of chloride supplementation, until a limiting value is achieved. The wastewater became almost completely biodegradable after electrooxidation, with a BOD5 to COD ratio of 0.94. UV and IR spectra of the effluent after electrooxidation showed that color destruction may be due to the disruption of the color-causing conjugated system of double bonds in the dye

096

Fisher and Paykel Motor as Alternator for a 200-Watt Pico-hydro Power Supply System

DESCRIPTION

A Fisher and Paykel motor was converted to a generator and is evaluated if it can be a suitable alternative generator for a 200-W pico hydro power supply system. The no-load set-up shows that the converted motor behaves much like an ordinary synchronous generators but the measured frequency is almost three times than the computed value. Furthermore, for the generator to produce 200 watts of power to a load, it must be ran at more or less 700 revolutions per minute.

097

Single-Phase Axial Flux Permanent Magnet Alternator for Micro-hydropower Applications

DESCRIPTION

An axial flux permanent magnet (AFPM) was developed in single-rotor single-stator configuration tested in a single and double stranded type of coil windings. Computations of the magnetic flux density distribution in the air gap were presented by a Faraday's disc method based on the mechanical design parameters of the machine. When the alternator was connected loads at varying speeds, it showed that the double stranded coil winding system, which is coiled up half the number of turns that of single stranded, generated around 30% of the total power output of the single stranded run at the same speed.

098

Automatic Power Strip Design for a Standby Power Reduction at the University of the Philippines Los Baños

DESCRIPTION

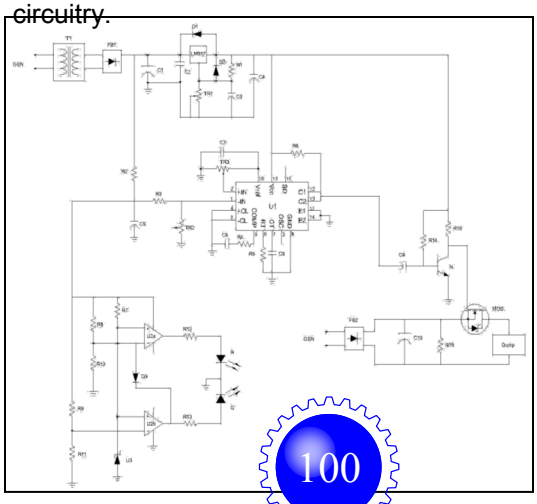
Using National Instruments Multism 11.0 electronic simulation software, the designed circuit was tested and simulated. An automatic power strip or power outlet which will disconnect appliances which at standby mode was designed. The results of the simulations showed that the logic and function of the design are

099

Design of an Electronic Load Controller for a 200-Watt Pico-hydro Power Supply System

DESCRIPTION

Voltage, current and frequency of a 200-W synchronous generator were measured at varying speed and load intervals to define the parameters to consider in the design of the ELC. The design was guided through computer-based simulation using components database and actual testing of various blocks using locally acquired components. As a whole circuit, the virtual simulation showed that the ELC was able to steer power accordingly to desired response and duty cycle, yet, it showed a need for improvement on the isolation and switching circuitry.



100

Development of an Electrical Energy Efficiency Program of Electrical Engineering Building Using Data Envelopment Analysis

DESCRIPTION

In order to have a basis for the improvement of the efficiency of the system, several data were gathered such as the electrical consumption of the building, way of usage of the system, number of people, number of electrical loadings and usage of extension wires. Area. The data were then analyzed using the non-parametric relative efficiency calculation method, Data Envelopment Analysis. This calculation was done in order to approximate the efficiency of the system and to know how much percentage can the system be improved when used in more efficient way.

101

Forecasting Electricity Reserve of Luzon by Time Series Method

DESCRIPTION

This study forecasts the system net reserve of Luzon by time series method. Autoregressive Integrated Moving Average (ARIMA) model is applied to time series analysis to estimate the future values of the peak demand. This employs forecasting of energy demand using only historical data of the system peak demand, the capability and the net reserve. The method presented provides a procedure of forecasting energy demand in conditions of inadequate data. The Philippines Energy Plan (PEP) of the Department of Energy (DOE) is used to determine the future system available capacity.

The system reserve of Luzon is determined based on the forecasted energy demand considering the 13.2% of the energy demand as the spinning reserved required by the National Transmission Corporation and the system capacity from the PEP. The analysis of the system reserve can provide the possible condition of the Luzon grid and hereby drives various plans and decisions of the government and private sector on investment and construction of additional power plants to cope with the increasing energy demand in the region.

102

Selection Framework for the Grid-Tied Renewable Energy System of the Electrical Engineering Building, UPLB Using Multi-attribute Decision Analysis

103

DESCRIPTION

Reasonable selection among the four options of renewable energy (biomass gasification, micro-hydropower, solar photovoltaic and wind turbine generator) to be considered as best alternative is achieved using multi-attribute decision analysis. The result was a construction of the alternative profile of the four renewable systems. It showed that solar photovoltaic system is the most desirable among the other alternatives followed by biomass gasification, micro-hydropower and, lastly, wind turbine generator.

Single-Wire Earth Return (SWER) Distribution System in Lipa Soil Series

104

DESCRIPTION

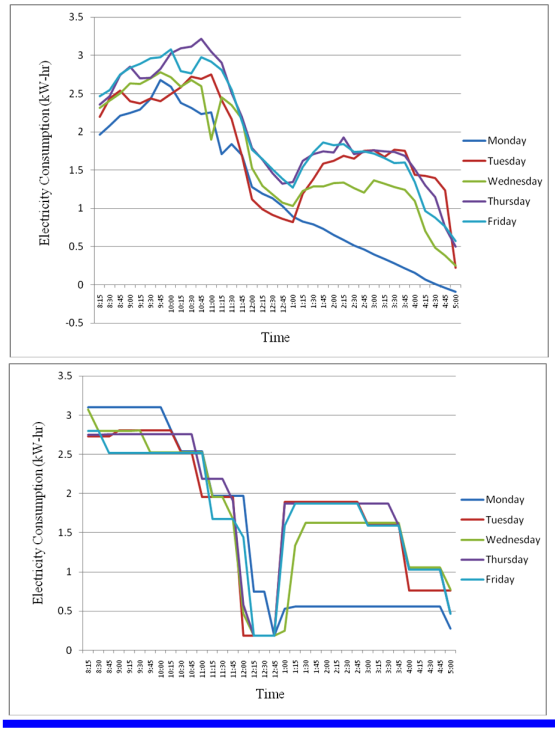
To assess the effectiveness and efficiency of implementing SWER in the local setting, several considerations were taken into account to evaluate the performance of the ground as a conducting path. There has been an evaluation of soil series in Lipa for SWER system. Consequently, the analysis on the effect of various factors to the voltage drop of a SWER system was prepared. Also, modeling the voltage drop of the Lipa Soil Series was also taken into account. Moreover, analysis on the effect of varying voltage levels on a short-distance SWER system was made.

Modeling the Energy Performance of the CEAT Library at Electrical Engineering Building, UPLB Using Least Square Analysis

105

DESCRIPTION

Different factors which contribute to the electricity consumption of the library were considered and categorized into two – direct factors that includes air conditioning units, lightings and computers, and indirect factors that includes time, people and room temperature and were analyzed using least square regression analysis available in Statistical Packages for Social Sciences program to determine their relationships.



Graphs of the predicted electricity consumption using ndirect (above) and direct (below) factors.

Standard Time of Main Operations in the Production of Jatropha

DESCRIPTION

Standard times for the main operations involved in Jatropha Production in flat terrain (such as seedling preparation, transplanting, weeding, fertilizer application, pruning and harvesting) were established using time study methods. These standard times can be used for farm production planning, production scheduling, manpower planning, and equipment planning. These can also serve as the basis for the development of a fair wage system.

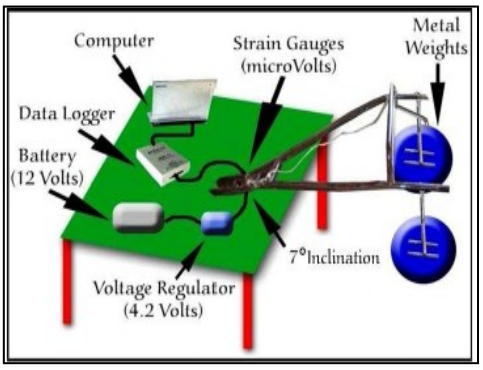
FEATURES

- separate standard times for each operation in the production of Jatropha
- simple and straightforward formulas to compute the completion time for each operation given the amount of land area to be farmed
- includes prescribed task set-up preparation and prescribed procedure for each operation

Digital Logging Instrumentation of Musculoskeletal Loading

DESCRIPTION

The application of strain gauges acting as variable resistors in a Wheatstone bridge electrical set-up, and the amplification and calibration of the resulting output microvolt (μV) readings from the minute bending on the handle. The tool was developed in order to measure the stress that Philippine operators are exposed to while exerting multidirectional forces on the handle of locally made hand-tractors.



107

FEATURES

- may be used for the modification of handle design for ease of use and prevention of Work Related Musculoskeletal Disorders
- prescribes a data logging set-up for the quantification of forces for ergonomic research on musculoskeletal loading and operator capacity
- software automatically converts microvolt readings into meaningful Newton forces (N) in the 16-to-32-kg range in increments of 2-kg intervals

Application of Systems Approach for Supply Chain Modeling of Philippine Feed Corn

DESCRIPTION

The application of the systems approach for supply chain modeling of Philippine feed corn. The systems approach advocates improving the overall performance of the supply chain as a whole rather than only optimizing each participant separately. A mathematical approach in analyzing the supply chain was used to create a general model for network optimization, in this case minimization of the system-wide logistics costs, and the evaluation of the effects of central post harvest facility.

108

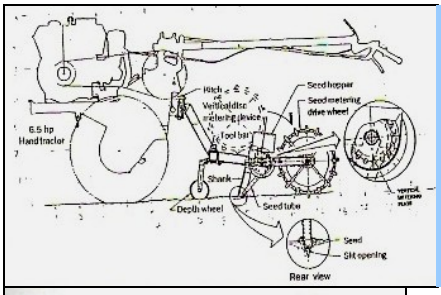
FEATURES

- static and deterministic mathematical model representing the network configuration of the feed corn supply chain that minimizes the total operations costs and aids in strategic level decision making
- assessment of several model scenarios in terms of total operation costs and local resource utilization
- proposes centralized drying facility for each province to lower drying and post-harvest losses

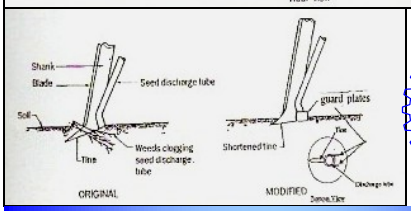
Vertical Metering Slit Seeder

DESCRIPTION

The machine was designed and developed to aid in establishing dried seeded rice crop early in the wet season using value engineering principles for increased yield productivity. It incorporates features of soil conservation tillage and weed control with slit seeding technique. It consists of a seed hopper, a metering device, ground drive wheel, a seed delivery tube, and the tine which is a soil slitting device. The tine eliminates weed residue accumulation and soil clogging of the seed discharge hole as well as reducing the experienced vibration



vertical metering slit seeder in operating mode



109

modification of tine and provision of wing to eliminate weed residue accumulation and clogging of the seed discharge hole

FEATURES

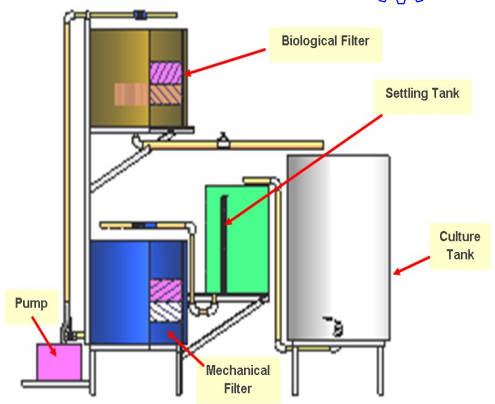
- Consistent rate of rice seed delivery
- Constant depth & spacing of seed deposits with proper positioning into the subsoil
- Minimal soil disturbance for ground moisture conservation
- Self-clearing of field trashes and weeds
- May be drawn by either a draft animal or hand tractor

Lahar Filtration System

110

DESCRIPTION

The lahar filtration system is used to filter wastes in recirculating aquaculture system. It is compose of a settling tank, mechanical filter and biological filter with lahar as filter media. The system can be attached to a fish culture tank to reduce solid wastes from recirculating into the culture tank through its mechanical filter component and to lessen the concentrations of toxic chemicals produced during the culture of fish through its biological filter component. The system can allow 95% -100% recirculation of water per day without exceeding the permissible limits of toxic chemicals present in various forms thus allowing high stocking density for fish culture.



Lahar filter media: a) fine (< 2mm diameter) b) gravel (2-4mm diameter) & c) gravel (> 4mm)

FEATURES:

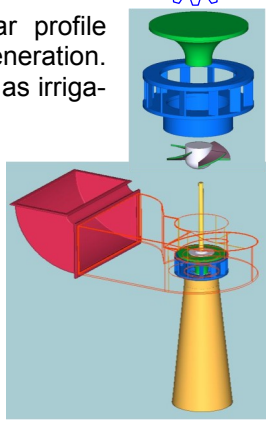
- Made from ordinary 200-liter drum and plastic pipes
- Simple filtration system design for easy fabrication
- Easy maintenance and cleaning with its removable compartments and provision of drain plugs at the bottom of the containers

Propeller Type Turbine for Low Head Microhydro Power Generation

111

DESCRIPTION

The compact micro hydro turbine consisting of a fixed blade propeller type runner, rectangular profile scroll case and straight conical draft tube is designed to produce power for electricity generation. The system can be installed in areas where there is abundant water with low head flow such as irrigation canals where the operation could be on a 24/7 scheme.



FEATURES

- Casted.runner and guide vanes
- Can produce brake power ranging from 384W to 409 W operating at 550 RPM under 1.2 m head with 70% system efficiency.
- Requires water flow of 0.045 m^3/s of water flow
- Easy to fabricate and maintain

Ergonomically Designed Two-Wheel Tractor

DESCRIPTION

The ergonomically designed two-wheel tractor is a modification of the common local tractor with the integration of anthropometric measurement of farmer operators. The modifications include the dimensions on the handle diameter/handle grip, cage wheel diameter and size, handle length, handle grip length, handle height, handle to handle distance, distance of engage clutch from the handle and foot to implement clearance.

FEATURES

- Light and compact
- Less fuel consumption due to smaller engine requirement
- Easy to maneuver, control and balance
- Less drudgery imposed to the operator

112

SIXTEEN YEARS
and going strong!

Congratulations CEAT!

We are one with you in celebrating 100 years of existence and continued excellence!

-EE FAMILY

A perfect gift for CEAT*'s 100th year*

100% EE Board Exam passing rate!

"CEAT's 100 Years of Service, Excellence and Leadership"

We celebrate this academic milestone with the college while we keep this tradition burning in the next 100 years through our 15th anniversary activities:

outrEEach program

squEEze ur mind

lEEbreng sakay

semEEnar

exhEEbit

wEEzards

UPLB SELES Alumni Association

UPLB Society of ELectrical Engineering Students

EST. 1998

LOGO MAKING CONTEST

The purpose of the contest is to design a suitable logo for the Centennial Celebration of CEAT which captures the vision, mission, and character of the college and its theme **"Kaagapay sa paghubog ng katangi-tanging Inhinyero at pagtataguyod ng angkop na teknolohiya para sa susunod na siglo."** The logo will be used by the CEAT for its websites, posters, letterheads, envelopes, and other communication paraphernalia.

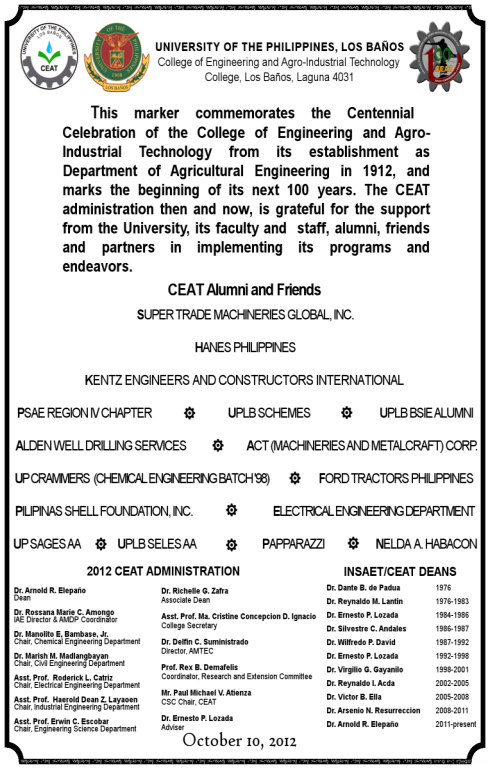
Judging was based on the following criteria

a.	Relevance to the Theme	40%
b.	Originality and Creativity	30%
c.	Visual Impact	30%

The gear represents engineering and technology as a whole. The oblation represents excellence. The number 1, in 100, is an arrow directing upwards symbolizing improvement. Maroon and green as colors of the university which mold every person involved in CEAT-UPLB. Golden yellow represents aspiration towards a brighter future. **Ms. Jessa Mae T. Loresto**, BS Chemical Eng'g student was the winner of the Logo Making Contest.

The other entries for the Logo Making Contest.

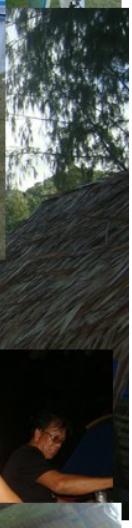
Centennial Kick Off—Loyalty Parade, Chinese Lantern Flying, Tree Planting, Awards Night (Oct. 2011)



The CEAT Centennial Memorabilia & Commemorative Marker

Testimonial for Graduating Students

CEAT TEAM BUILDING




CEAT CENTENNIAL LECTURE SERIES
CEAT @ 100
CEAT Centennial Lecture Series
"The Best Years of CEAT"
DR. DANTE B. DE PADUA
INSAET Dean, 1976
9:00 AM March 2, 2012
CEAT Lecture Hall
TWENTY-TWO YEARS
OF
ENGINEERING
in UP Los Baños

STUDENTS' ACTIVITIES

CEAT Centennial Lecture Series

Date	Speaker	Topic
12 December 2011	Engr. Lazaro B. Ganancial Jr. Engr. Gerry Ibarrientos	LEAD ACID BATTERY: Application, O&M and Sizing
4 January 2012	Dr. Andro H. Mondala	Research and Graduate Education at the Bagley College of Engineering – Mississippi State University
16 January 2012	Dr. Ernesto P. Lozada	Generation Characteristics of the Los Baños (EPL-2) Burner
6 February 2012	Dr. Richelle G. Zafra	Seismic Performance of a Full-Scale Polypropylene Fiber Reinforced Cement Composite Bridge Column Based on E-Defense Shake-Table Excitation
13 February 2012	Prof. Kimberly T. Solon	Anaerobic Digestion of Manure: Improved Modeling by Taking into Account Physico-Chemical Effects
20 February 2012	Dr. Arsenio N. Resurreccion Dr. Arnold R. Elepaño Dr. Engelbert K. Peralta Dr. Jovita L. Movillon Prof. Rex B. Demafelis Prof. Moises A. Dorado Prof. Marion Lux Y. Castro	Aligning CEAT to UP's Role as a National University in the Next 18 Years: ARoadmap
28 February 2012	Prof. Ginghis Maranan	Comprehensive Numerical Analysis of Nuclear Power Plant Building Subjected to Seismic Loads
2 March 2012	Dr. Dante B. de Padua	The Best Years of CEAT
5 March 2012	Prof. Paolo Rommel P. Sanchez	Development of a Fluidyne Water Pump for Irrigation
12 March 2012	Prof. Ma. Christine Concepcion D. Ignacio	Thermo-Physical Properties of Nano Silica-in-Fluid Dispersion (Nanofluids) Derived from Rice Hull Ash
19 March 2012	Prof. Ma. Morissa Lu	Characterization and Performance Analysis of Nanosilica Powders from Rice Hull Ash as Moisture Sorbents
23 April 2012	Prof. Roderick L. Catriz	Voltage Drop Analysis for Short-Distance Single Wire Earth Return (SWER) Distribution System
30 April 2012	Prof. Rowaldo R. del Mundo	Assessment of the Philippine Electric Power Industry and Markets after 10 Years of the EPIRA Law
9 July 2012	Dr. Valentino M. Tiangco	Overview of the Renewable Energy in California: Some Insights for Community Development in Southeast Asia
16 July 2012	Prof. Mark Keylord S. Onal	Field Testing of a Jeepney-Mounted Micro-Wecs for Rural Off-Grid Area
23 July 2012	Prof. Arthur L. Fajardo	Evaluation of the System Efficiencies of Different Pump -Sets for Shallow Tube Well Irrigation
6 August 2012	Dr. Ronel S. Pangan	Development and Introduction of Appropriate Mechani-zation Technology for the Production of High Value Commercial Crops
13 August 2012	Dr. Fernando O. Paras Jr.	Development of SINAG: An Energy Efficient Egg Incubation System
10 September 2012	Dr. Kevin F. Yaptenco	Heat Treatment of High-Value Crops by Hot Water Immersion
1 October 2012	Dr. Roger Luyun, Jr.	Laboratory-Scale Investigation of the Dynamics of Artificial Recharge of Aquifers

Analysis on the Voltage Drop of Off-Grid Single Wire Earth Return (SWER) Distribution Line and its Potential Applications in a Micro-hydro System

RODERICK L. CATRIZ
Assistant Professor, Electrical Engineering Department

Rossana Marie C. Amongo, Arthur L. Fajardo and Chiliast B. Juan

Abstract: Single Wire Earth Return (SWER) is a power distribution using only one wire and having the ground as the return path. This can be used as electrical distribution system for a micro-hydro power source which is location-specific and may not be readily accessible and connected to the grid. The need for an effective electrical distribution system is necessary to maximize its power utilization. A 500-meter SWER distribution system was installed in a Lipa soil series to determine the effects of different factors (i.e. value of voltage source, load resistance, distance from the source and depth of the grounding rod) affecting voltage drop of the ground. The ratio of voltage drop over voltage source was taken to determine the effectiveness of SWER as distribution system. Results showed that SWER is influenced by the following factors in descending order of importance: load resistance, depth of copper rod, distance, and finally the voltage source. Moreover, voltage drop is correlated to all the independent factors (Distance=0.175, Depth=-0.542, Vsource=0.470 and Load=-0.408). Regression analysis was undertaken to determine the best model describing voltage drop. The best model with the highest value of the adjusted R^2 of 86.6% was chosen to describe the behavior of voltage drop.

Evaluation of the System Efficiencies of Different Pump-sets for STW Irrigation

ARTHUR L. FAJARDO
Assistant Professor, Agricultural Machinery Division, IAE

Abstract: Cost effectiveness and sustainability of shallow tubewell (STW) makes it popular in irrigated agriculture. One factor which affects STW's cost effectiveness is efficient pump set operation, thus, it is important to make a comparative assessment of the system efficiency of the different pump sets used for STW.

Fifty eight (58) pump-primemover combinations were set up by matching each of five (5) centrifugal pumps with three (3) types of primemovers namely: diesel engines (six units), gasoline engines (three units), and electric motors (three units). Each of the 58 pump sets was run at varying pump test speed: 1300, 1500 and 1800 rpm for non-self priming pumps; and 1500, 1800 and 2000 rpm for self priming pumps.

The average fuel consumption obtained by diesel engine pump sets was about 0.92 liters per hour while the average electrical consumption obtained by electric motor pump sets was about 3.40 kilowatt-hour.

Overall system efficiency of self priming pump sets was about twice as much when compared with overall efficiency of non -self priming pump sets with the same primemover and pump test speed.

The average overall system efficiency of all electric motor pump sets was about 23.85% compared to diesel engine pump sets with only about 9.39% and gasoline engine pump sets with only about 5.60%. Highest overall system efficiency of about 41.05% was obtained by 4x4-Electric Motor A pump set operated at 1300 rpm while the lowest overall system efficiency of about 2.30% was obtained by NS 50-Gasoline Engine 11.5 pump set operated at 1500 rpm.

The best option to be considered as primemover for STW irrigation would be the electric motors considering high overall system efficiency obtained by electric motor pump sets. However, due to limitations of electric motors in the field, diesel engines were the popular primemover used in STW irrigation. The 5.22 kW diesel engine used for this study had shown relatively good performance when operated with all pumps especially at lower pump speeds of 1300 and 1500 rpm.

Thermophysical Properties of Nanosilica-in-Fluid Dispersion (Nanofluids) Derived from Rice Hull Ash

MA. CRISTINE CONCEPCION D. IGNACIO
Assistant Professor, Engineering Science Dept.

Abstract: Nanofluid was developed from this study by dispersing nanosilica powder derived from rice hull ash to deionised water as base fluid. From SEM analysis, the size of the nanosilica powder ranges from 40 to 65nm.

Stability of the nanosilica-in-fluid dispersion (nanofluids) was evaluated using sediment photography and UV-Vis spectrophotometer methods. From the results, nanofluids of 1%, 2% and 3% volume concentration were stable or experience no significant sedimentation for five days compared to 4% and 5% volume concentration nanofluids which were stable for two days only.

The measured densities of the nanosilica-in-fluid dispersion do not show much change compared to the base fluid. An increased in dynamic and kinematic viscosity was observed for nanosilica-in-fluid dispersion (nanofluids) by as much as 202%.

The measured specific heats of the nanofluids in five volume concentration showed a reduction compared to the base fluid specific heat. The percent decreased in specific heat ranges from 3% to 25%.

The enhancement of thermal conductivity of water reached up to 50% after dispersing nanosilica powder at different volume concentrations and measured at different temperatures from 30°C to 70°C. The dependence of thermal conductivity to temperatures was also observed in this study and showed a linear relationship of temperature with thermal conductivity.

For the computed properties like Prandtl number and thermal diffusivity, higher values were obtained compared to water.

Thermophysical property models (second-degree polynomial equations) were developed to best describe the behaviour of nanosilica-in-fluid dispersion (nanofluids) at different temperatures and volume concentrations.

From the results, these enhancements of thermophysical properties showed that there is a potential use of the nanosilica-in-fluid dispersion (nanofluids) as heat transfer fluid. But there is a need for further study to explain the reason why thermophysical properties are enhanced.

Characterization and Performance Analysis of Nanosilica Powders from Rice Hull Ash as Moisture Sorbents

MARIA MORISSA D. LU
Assistant Professor, Engineering Science Dept.

Abstract: Pure and ethylene glycol (EG)-impregnated nanosilica powders were synthesized from rice hull ash (RHA) and their sorption properties for water vapor were investigated.

The morphology, elemental compositions, surface area and pore structures of nanopowders, were elucidated using scanning electron microscopy (SEM) and nitrogen adsorption-desorption. SEM results showed that the particles were in agglomerated form with dimensions of 62 to 84 nm and 41 to 65 nm for pure and EG-impregnated nanosilica powders, respectively. Energy dispersive x-ray spectroscopy indicated that silicon was the most abundant element present in both samples.

The nitrogen sorption isotherms are categorized as type IV with H3 hysteresis loops by IUPAC classification.Pure nanosilica powder surface area was 48.11 m^2/g, which was slightly more than that of EG-impregnated nanosilica powder with surface area of 38.65 m^2/g. Pore size distribution curves demonstrate the mesoporous nature of both samples.

Water sorption isotherms of nanopowders at 5, 30 and 60°C and relative humidity ranging from 10.95 to 88.61% were determined using the static gravimetric method. The equilibrium moisture content (dry basis) of pure nanosilica powder ranged from 0.051 to 0.857, 0.024 to 0.565, and 0.016 to 0.283 at 5, 30 and 60°C respectively. For EG-impregnated nanosilica powder the EMC ranged from 0.060 to 0.967, 0.027 to 0.388, and 0.026 to 0.209 at 5, 30 and 60°C respectively.

The correlation of experimental data to some chosen theoretical models shows that the Guggenheim-Anderson and de Boer (GAB) model is the most adequate to describe moisture sorption isotherms on nanosilica powders for various temperatures and relative humidities studied.

The significant result in the moisture sorption characteristics of powders is that both nanosilica powders reveal potential to be utilized as moisture sorbents at air relative humidity levels greater than 70% at all temperatures studied. Since nanosilica is widely used in many researches and with applications in different fields as sorbents and catalyst, these results on water sorption characteristics of nanosilica powders will be beneficial for the processing and end-use applications of the powders.

Laboratory-Scale Investigation of the Dynamics of Artificial Recharge of Aquifers

DR. ROGER A. LUYUN JR.
Assistant Professor, Land and Water Resources Division

Abstract: Seawater intrusion is often a major constraint to optimal use of fresh groundwater from coastal aquifers. Excessive groundwater abstraction to meet growing demands from an increasing coastal population and the

expected rise in mean sea level from global warming will cause seawater to encroach farther inland and threaten the available groundwater supply. Among several control strategies proposedto control seawater intrusion, the application of artificial recharges through storage ponds and injection wells is more applicable to Philippine setting. Excess runoff during the rainy season can be stored in small water impounding projects (SWIPs) or small farm reservoirs (SFRs) for surface recharge or injected directly to the aquifer through shallow tubewells (STWs) converted to recharge wells.

In this study, laboratory-scale experiments and numerical simulations, using the SEAWAT code, were performed to determine the effectiveness of storage ponds and injection wells as artificial recharge structures. The effects of location and mode of application of recharge on saltwater behavior were analyzed. Results show that more effective saltwater repulsion can be achieved if recharge is applied near the saltwater toe. Recharge becomes less effective if applied farther and higher from the toe. These findings imply that, for the same recharge rate, recharge wells such as STWs are more effective than storage ponds such as SWIPs and SFRs in repulsing saltwater intrusion. For recharge ponds, the most effective location would be above the toe because of the increased pressure head created by the recharge water. Results from injection wells also show that for the same recharge rate, point injection achieved about the same saltwater repulsion as line application.

The flow dynamics established in this study may also be applied in the context of the recent floods caused by monsoon rains and typhoons that wreaked havoc in the country. These artificial recharge structures may be used to control or prevent flooding. SWIPs and SFRs and some other alternative water harvesting techniques may be used to store the excess rainfall upstream, not only for subsequent use in agriculture but also to increase opportunity time for the infiltration of floodwaters to recharge the aquifers. STWs, on the other hand, may be converted to recharge wells during floods by injecting the runoff or floodwater directly into the aquifer. The choice of recharge method depends on several factors, such as water availability and its quality, soil and aquifer types, topographical and geological conditions, among others. In actual application, it is imperative to establish the design criteria, aquifer lithologic properties, other hydrologic or hydraulic requirements, and the operational procedures for the optimal operation of these recharge facility.

Comprehensive Numerical Analysis of Nuclear Power Plant Building Subjected to Seismic Loads

GINGHIS B. MARANAN
Assistant Professor, Civil Engineering Dept.

Abstract: Comprehensive numerical analysis of nuclear power plant (NPP) building subjected to seismic loading using two numerical tools, the Particle Discretization Scheme – Finite Element Method (PDS–FEM) and the Macro–Micro Analysis Method (MMAM), is conducted. The seismic capacity of NPP building is determined by performing Non–linear pushover analysis using the PDS–FEM implemented in the ADVENTURE_Solid. This capacity is based on the base shear versus top displacement curve. Lumped–mass model of fixed–base NPP building is used to establish the fundamental mode of the structure. The lateral displacement distribution, proportional to the fundamental mode, is applied in each floor level imitating the seismic loads condition. The seismic response of NPP building is calculated using MMAM. The fault–structure system of MMAM is rigorously decomposed into macro– and micro–analysis models employing the Singular Perturbation Expansion (SPE) that leads to an efficient multi–scaling. To verify the accuracy of MMAM, the results of wave velocity profile using MMAM are compared with Green's function and good agreement between the two methods is achieved. This study presented a framework of comprehensive numerical analysis method which is able to solve large–scale problems with high accuracy, less computational resources and cost.

Field Testing of a Jeepney– Mounted Three-Bladed Micro Windmill for Rural Off-Grid Area

MARK KEYLORD S. ONAL
Assistant Professor, Agricultural Machinery Division, IAE, CEAT

Abstract: The designed three-bladed micro windmill was tested for its actual application. This was mounted on the roof of a passenger jeepney travelling from an off-grid barangay of Naujan to Calapan City proper in Oriental Mindoro and vice versa. The intended application of the micro windmill is to charge lead acid battery for household energy consumptions. On the average, one car battery can be recharged in three roundtrips of the jeepney while two motorcycle batteries can be recharged for just one roundtrip. These batteries are commonly used lead acid batteries by the residents as an alternative source of electricity to power their electrical appliances and gadgets. Based from simple financial analysis made, the jeepney mounted micro windmill will only be viable if the batteries being recharged were motorcycle battery alone or the combinations of motorcycle and car batteries. The micro-windmill set-up will not be financially viable if only car battery is being charged by the system.

Development and Introduction of Appropriate Mechanization Technology for the Production of High Value Commercial Crops (HVCC)

DR. RONEL S. PANGAN
Engineer III, Agricultural Mechanization Development Program IAE

Abstract: High value crops like vegetables have been a part of every Filipinos' subsistence be it as food or source of livelihood. For many of our farmers, it has become one of the major income sources since growing vegetables can provide immediate cash for the family due to its short gestation period. Considering the importance of vegetable production in the country, the government included the vegetable industry in the Agriculture and Fisheries Modernization Act of 1997 (AFMA) as a promising income generator and was considered as one of the country's priority cash crops. However, growing vegetable is one of the most labor-intensive agricultural activity in the country since all of the farming activities are mostly done manually using hand tools or animal-drawn implements. This method according to the Asia Vegetable Research and Development Center (AVRDC, 1990) is considered low in terms of the level of mechanization due to the fact that farms are small, labor is cheap and still traditional. Using machinery can actually increase farm labor productivity by producing more with less labor. It was also noted that the efficiency of farm mechanization can be maximized if the technology will not be introduced as a single unit but as part of a technology package.

However, since majority of vegetable farmers have relatively small farm size, acquiring agricultural machines especially big machines like four wheel tractors for their production is not economical. With this present set-up, our local vegetable producers lag behind with their foreign counterparts in terms of production that they cannot compete with the world market. Likewise, many of our farmers sometimes experience losses especially when the market is already flooded by cheap imported vegetables. Farmers are forced to sell their produce at the prevailing price that they cannot even recoup their investments. This is one of the reasons why some farmers tend to shift to other form of livelihood.

To make our vegetable farmers more competitive, production in terms of yield must be increased or to decrease farmers' production cost. One way of achieving this is the timely usage of appropriate mechanization technology which does not only eliminate the drudgery of doing farm activities but for a faster and more efficient farming operation. Thus the AMDP is continuously doing design and development works regarding the mechanization needs of the farmers. Some of the developed technology include the UPLB mini-hand tractor, machines for organic fertilizer production and cassava flour processing, small tools and implements like weeders and sprayers, a simple soil sterilizer, a collapsible cold storage utilizing the evaporative cooling principle and a multi-crop washer.

DEVELOPMENT OF SINAG:
A Solar Assisted with Intermittent Ventilation Egg Incubation System*

FERNANDO O. PARAS JR.
Assistant Professor, Agricultural Machinery Division.

Rizalinda L. de Leon[2], Arsenio N. Resurreccion[3], Delfin C. Suministrado[3], Rectorino P. Escobin[4], Ralph Kristoffer B. Gallegos[1]

The study is about the development of **SINAG**: a solar assisted with intermittent ventilation egg incubation system. The term **SINAG** is an acronym for **S**olar **IN**cubation for **Ag**ricultural applications, which in Filipino means sun's ray; implying its utilization of solar energy. The study is an attempt to provide the poultry industry with an appropriate technology that is suited for small to medium scale production. A SINAG egg incubator prototype was designed and fabricated. The main strategies implemented in the SINAG system to enhance energy efficiency were solar assisted heating of the incubation space and intermittent operation of the ventilation device. The study revealed that 72.6% of electrical energy could be conserved by using the SINAG system. If the SINAG prototype was used for *balut* production, payback period for initial investment was just 10.5 month and annual income would be 3.3 times compared with the income from a conventional system.

Development of a Fluidyne Water Pump for Irrigation

PAOLO ROMMEL P. SANCHEZ
Assistant Professor, Engineering Science Dept.

Abstract: As oil prices continue to become unstable as the supply tries to meet the demand of the modern economy, the quest in the development of technologies which utilize alternative sources of energy continues.

Among the many technologies that are currently being developed, which are potential substitute for modern pumps, is the fluidyne. A fluidyne is a type of Stirling engine with liquid pistons which utilizes the expansion and contraction of a gas when heated and cooled to lift water. Being an external combustion engine, it can be powered by utilizing heat coming from combustion of biomass or from solar radiation.

Knowing such potential of a fluidyne, a laboratory prototype was designed, fabricated, optimized and tested using locally available materials and technology with the objective of determining its applicability for irrigation. Performance tests showed that the fluidyne had an average water delivery of460 L/h at a pumping height of two meters. From the results obtained, it showed that the fluidyne water pump alone could supply about all the crop water requirement of most crops such as small vegetables, vegetables of Solanum family, vegetables of Cucumber family, roots and tubers, legumes, perennial vegetables, oil crops, cereals, tropical fruits and trees of at least 862 m^2 up to 2,916 m^2. Comparing the maximum serviceable area of the pump for each crop, the results showed that the pump is least applicable to irrigate rice and most applicable to irrigate pineapple. To supply the irrigation water requirement of a 1-ha field farm planted with any of the cited crop, the farm needs at least 150 mm/month precipitation.he study was the first attempt to develop a fluidyne in the Philippines. Furthermore, the fluidyne can be attempted to be used on other water lifting applications or irrigation which requires small amount of water. Thus, the completion of the study served as basis for future research and development of fluidyne in the Philippines.

Anaerobic Digestion of Manure: Improved Modeling by Taking into Account Physico-Chemical Effects

KIMBERLY T. SOLON
Assistant Professor, Civil Engineering Dept.

Abstract: Anaerobic digestion is an old waste stabilization technology which is becoming widely-used and studied because of its additional advantage of energy production, thus considered as a sustainable technology. One of the advances in the field of anaerobic digestion is the development of the Anaerobic Digestion Model 1 (ADM1). In the ADM1, several processes are omitted which are considered as the limitations of the model. One of those limitations is the exclusion of ion activity corrections because it was assumed that anaerobic systems, in general, are dilute systems containing insignificant amount of ions. However, there are particular anaerobic systems with high levels of ions, such as those used for anaerobic digestion of cattle manure, that it is essential to include corrections for non-ideality. This study assessed the effects of taking into account ion activities on anaerobic digestion modelling.

The first part of the study is the comparison between the Debye-Hückel, Extended Debye-Hückel, Güntelberg, Davies, and "WATEQ" Debye-Hückel ion activity correction expressions considering the ions which are commonly present in cattle manure. In the second part of the study, a system involving thermophilic anaerobic digestion of cattle manure was considered according to the study of Batstone et al. (2003). Steady-state and dynamic conditions were set in the ADM1 model and the results of the simulation were compared to that obtained in a similar model with ion activity corrections.

The significant difference between the obtained ion activity coefficients using the different ion activity correction expressions suggests that in running simulations with an input different from that used in this study, the appropriate ion activity correction expression should be used depending on the ionic strength. It is observed that selection of the correct activity coefficient model becomes critical at ionic strengths exceeding about 0.2 mol/kg and that ion-activity corrections are essential for correct model calculations of pH when the ionic strength of the wastewater exceeds about 0.2 mol/kg.

Heat Treatment of High-Value Crops by Hot Water Immersion

KEVIN F. YAPTENCO
Associate Professor, Agricultural and Bio-Process Division

Abstract: Many fruits and vegetables are considered as high-value crops and are highly perishable by nature. They are vulnerable to many insect pests and diseases which are already present during production but only manifest themselves after harvest. For example, eggs and larvae of the Oriental fruit fly of the Philippines are common in 'Carabao' mango; due to the presence of this pest, fruit exported to some countries must undergo quarantine disinfestation to be allowed entry. Postharvest diseases such as anthracnose and stem-end rot also cause severe losses if not controlled. Exporters to Hong Kong report outright losses of 20% due to disease (Esguerra and Bautista 2007); in domestic markets, incidence of anthracnose can reach 62% or more (Serrano et al 2007).

Physical treatments using heat to kill pests or inhibit disease development are the most commercially used methods of treatment. Vapour heat treatment (VHT) is used for disinfestation of fruit exported to Japan, South Korea, Australia, and the USA. Exporters to China prefer to use the extended hot water treatment (EHWT) protocol (holding period of 15 min at 46°C pulp temperature with 10-min air cooling) due to the lower cost involved. For postharvest disease control, hot water treatment (HWT) is recommended where fruits are immersed for 10 min at 52-55°C. For areas where preharvest disease pressure is low, a shorter hot water dip (HWD) of 30-60 sec at 59-60°C can give sufficient control of disease.

Equipment used commercially for HWT may be batch-type or continuous-type tanks. Philippine exporters mainly use batch-type units, with capacities ranging from 75 kg to 500 kg per batch. Units with conveyors may also be used but are more expensive; one system in use by an exporter cost Php 2 M (Marquez 2010, personal communication). Estimated cost of a batch-type system (500-kg capacity) is about Php 400,000.

Due to the long treatment time of HWT and large volumes of fruit to be handled, exporters commonly modify the protocol in order to meet shipping schedules. Lower temperatures may be used, dipping times reduced, or both. This has been observed for HWT, resulting in ineffective treatments which have little or no effect on disease. Some deficiencies in design have also been observed; e.g. non-uniform temperatures, inadequate water circulation, lack of automated temperature control.

Development of a hot water tank with automatic temperature control was initiated by the Postharvest Horticulture Training & Research Center (UP Los Baños) in 1991; a batch-type unit with a capacity of 80 kg of fruit and equipped with electric Heaters was produced. Subsequent modifications based on this design followed, with capacity increased to 160 kg and using LPG burners for heating. In collaboration with the AMDP-IAE-CEAT in 2008, a prototype with an improved heating system was developed which reduced LPG consumption. Several units based on this design have been adopted by fruit exporters and traders nationwide.

In 2007, China allowed the importation of fresh 'Carabao' mango treated with the EHWT protocol. Treatment tanks with larger capacities, automatic temperature logging, and computerized control of loading and unloading were needed for this application. A prototype unit was developed with a batch capacity of 440 kg, improved heating system, mechanical lifter, data logging and control system, and computer software. Preliminary trials were conducted on mango and papaya in collaboration with a fruit trader; results showed no heat damage, reduction in rejects, and ability of the system to handle the fruit load was proven. Development of the prototype was funded by the DA Bureau of Agricultural Research and the AMDP.

Aside from 'Carabao' mango and 'Solo' papaya, other high value crops are also known to benefit from HWT. Sugarcane setts are treated for ratoon stunting disease and used as planting material in certified nurseries; these are then disseminated to plantations (Luzaran 2012, personal communication). Rice seeds are treated at 55-58°C for 15 min to eliminate nematodes before being exported to countries such as Bangladesh and Indonesia (Collo 2012, personal communication). Other crops that may potentially benefit from hot water treatment include pineapple and organically grown bananas. Negotiations are ongoing with commercial growers to conduct laboratory and field tests on these crops.

Seismic Performance of a Full-Scale Polypropylene Fiber Reinforced Cement Composite Bridge Column based on E-Defense Shake-Table Excitation

RICHELLE G. ZAFRA
Assistant Professor, Civil Engineering Department

Kazuhiko Kawashima[2)], Tomohiro Sasaki[3)], Koichi Kajiwara[4)] and Manabu Nakayama[5)]

Abstract: As part of a major study on the seismic response of bridges by the National Research Institute for Earth Science and Disaster Prevention (NIED), Japan, a full-scale column incorporating an innovative material - polypropylene fiber reinforced cement composites (PFRC) at the plastic hinge region and part of the footing was recently tested on the E-Defense shake-table of NIED. The column was subjected to three components of the near-field ground motion recorded at the JR Takatori station during the 1995 Kobe, Japan earthquake. Excitations were repeated under increased mass and increased intensity of ground motion. After six times of excitation, the experimental results showed that use of PFRC substantially mitigated cover concrete damage and local buckling of longitudinal bars. Measured strains of tie reinforcements in the plastic hinge were also smaller. Moreover, there was no visible damage in the core concrete after the series of excitations. The damage sustained by the column using PFRC was much less than the damage of regular reinforced concrete columns.

Renewable Energy Development in California: Some Insights for Community Development in Southeast Asia*

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Abstract: Renewable energy resources propelled human civilization prior to the Industrial Revolution and have remained both essential energy producers and drivers of progress. Since then renewable energy sources are viewed today as increasingly vital to economic growth and sustainable development not only in California, but the whole United States, Europe and Asia. The contributions of renewable energy resources and corresponding energy conversion technologies to the world's energy supply mix will substantially increase due to policy mandates, improving cost-competitiveness, and other factors. Investing in renewable energy is a central element of rebuilding California's economy. Investments in renewable energy create local jobs both in clean tech industries and support industries like construction. Renewable generation facilities also provide economic benefits in the form of increased property and sales taxes. In addition to its contribution to the state's economy, renewable energy also improves California's energy independence by using local energy sources and fuels rather than imported natural gas which is susceptible to supply shortages and price spikes. Increasing the amount of renewable resources in California's electricity portfolio also benefits the environment by reducing fossil-fuel generation that has negative impacts on air and water quality. Renewable resources are also essential to achieving the state's greenhouse gas emission reduction goals and reducing climate change impacts from the electricity sector. This seminar presents the overview of renewable energy development in California and some implications in South East Asia.

*CEAT Centennial Lecture delivered on July 9, 2012 at the CEAT Lecture Hall.

Dr. Dante B. de Padua
INSAET Dean, 1976

The Best Years of CEAT
Dr. Dante D. Padua

CEAT Centennial Lecture delivered on March 2, 2012
at the CEAT Lecture Hall, during the celebration of the CEAT Foundation Day

Prof. Rowaldo R. del Mundo
Associate Professor,
EEEI, UP Diliman

Assessment of the Philippine Electric Power Industry and Markets after 10 Years of the EPIRA

CEAT Centennial Lecture delivered on April 30, 2012
at the CEAT Lecture Hall.

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Activities of the CEAT Alumni Association, Inc.

The CEAT Alumni Association, Inc. (CEAT-AA) has always been supportive of the mission, vision and programs of the college. Through the years, it has provided assistance to the college by actively participating in various activities and providing financial support. For 2012, the association joined CEAT in the following activities:

- Joining the CEAT constituents in welcoming the AY 2012-2013 freshmen during the orientation program held in June 2012.
- Honoring CEAT graduating students by awarding medals of excellence to honor students and welcoming them as new members of the association during the April 2012 Testimonial program.
- Providing financial support to the CEAT athletes during the Palarong UPLB in February 2012.
- Awarding the Outstanding CEAT Personnel during the 2012 CEAT Foundation Day on March 2, 2012.
- Co-sponsoring the CEAT Centennial Concert at the DL Umali Hall, UPLB on March 2, 2012.
- Participating in the CEAT centennial kick-off on October 10, 2011; and continually supporting this year's CEAT Centennial Celebration.
- Continuing its efforts to update the list of CEAT alumni and their contact information through the establishment of a CEAT Alumni Directory to strengthen alumni relations.
- Initiating active search and nomination of alumni awardees. This year, two (2) distinguished CEAT alumni were recognized by the UP Alumni Association during the UPAA alumni homecoming and awarding ceremony held at the *Bahay ng Alumni*, U.P. Diliman campus, Q.C. on June 23, 2012. The awardees were:

Engr. FERDINAND M. CATABAY
BS Chemical Engineering 1991
2012 UPAA Distinguished Alumnus Awardee in Technology and Enterprise Production Management

Dr. DELFIN C. SUMINISTRADO
BS Agricultural Engineering 1976
2012 UPAA Distinguished Alumnus Awardee in Agricultural Engineering

- Hosting of the yearly CEAT alumni homecoming every October 9-10 celebration of the UPLB Loyalty Day.

The CEAT 2012 Board and Officers are the following:

Dr. JOVITA L. MOVILLON (*President*);
Prof. MOISES A. DORADO (*Vice-President*);
Dr. ROSSANNA MARIE C. AMONGO (*Secretary-Treasurer*);
Prof. RODERICK L. CATRIZ (*Auditor-PRO*);
Dr. DANIELITO T. FRANCO (*Board Member)*;
Dr. VICTOR B. ELLA (*Board Member)*;
Dr. ARSENIO N. RESURRECCION (*Board Member)*; and
Dr. ARNOLD R. ELEPAÑO (*Ex-Officio Board Member).*

Note: This article was also published in the 94th Loyalty Day Souvenir Program

CEAT AA Meeting (from right Dr. MS Madlangbayan, Dr. J.L. Movillon, Dr. AN Resurreccion, Prof. MA Dorado, Prof. MYL Castro, Dr. RC Amongo and Dr. JC Elauria)

CEAT-IAE Staff performing during the CEAT Centennial Concert on March 2, 2012 at DL Umali Hall, UPLB

CEAT faculty, staff, students and alumni celebrating 100 years of excellence during the Centennial Kick-Off Celebration on October 10, 2011 at the Elec. Eng'g Grounds, CEAT, UPLB

Tree planting activity during the CEAT Centennial Kick-Off celebration , Elec. Eng'g Grounds (from left, Dr. EP Lozada, Mr. BC Geronimo of AMDP, Dean AR Elepaño, Dr. Guillermo Q. Tabios III, 2011 CEAT Distinguished Alumnus Awardee, and Dr. VA Rodulfo, Jr. of AMDP

The 2012 Outstanding CEAT Personnel during the CEAT Foundation Day on March 2, 2012 (2nd from left Mr. RA Derequito, Dr. ME Bambase, Jr. <receiving the award for Dr. CA Alfafara>, Engr. BG Bataller, Dr. DC Suministrado, Dr. RS Pangan, & Mr. BP Damasco), with Dr. AN Resurreccion (1st from left), CEAT retiree & former Dean, who was awarded with a Plaque of Recognition for 40 years of service, and Dean AR Elepaño (extreme right).

2012 CEAT ALUMNI AWARDEES

DR. AIDA C. DECENA SOLSOLOY
BSST '74, MS '85, PhD '92
2012 UPLBAA Outstanding Alumna in
Technology Development in Pest Management

DR. SILVESTRE C. ANDALES
MS Agricultural Engineering, 1970
2012 UPLBAA Outstanding Alumnus in
Rice Postharvest R &D Technology
and Dissemination

DR. DELFIN C. SUMINISTRADO
BS Agricultural Engineering 1976
2012 CEAT Distinguished Alumnus in
Agricultural Engineering
Research and Education

ENGR. FERDINAND M. CATABAY
BS Chemical Engineering 1991
2012 CEAT Distinguished Alumnus
In Technology and Enterprise Production
Management

PROF. MAXIMINO G. VILLANUEVA
BSA major in Agricultural Engineering 1960
2012 CEAT Distinguished Alumnus
in Electrical Engineering Education

CEAT OUTSTANDING ALUMNI

2012
Dr. Aida C. Decena-Solsoloy
BSST '74, MS '85, PhD '92
UPLB TOUAA

Dr. Silvestre C. Andales
MSAE '70, PhD
UPLB TOUAA

Dr. Delfin C. Suministrado
BSAE '76, MS, PhD
UPAA Distinguished Alumnus and
CEAT Distinguished Alumnus

Eng'r. Ferdinand M. Catabay
BSChE '91
UPAA Distinguished Alumnus and
CEAT Distinguished Alumnus

Prof. Maximino G. Villanueva
BSA major in Ag Eng '60

2011
Dr. Ernesto C. Tuazon
UPLB TOUAA
BSST '61, MS, PhD

Dr. Casiano S. Abrigo, Jr.
BSST '75, MS, PhD

Dr. Guillermo Q. Tabios III
BSAE, MS, PhD

Dr. Marish S. Madlangbayan
BSCE '97, MS, PhD

2010
Dr. Bonifacio F. Comandante, Jr.
BSAE, MS, PhD
TOUAA

Dr. Danielito T. Franco
BSAE '69, MS '73, PhD
CEAT Distinguished Alumnus and
UPAA Distinguished Alumnus

Prof. Rex B. Demafelis
MS '90
CEAT Distinguished Alumnus and
UPAA Distinguished Alumnus

Dr. Reynaldo M. Lantin
BSA '59, MS, PhD

2009
Dr. Wilfredo P. David
BSA '65, MS, PhD

Mr. Manolo A. Garcia
BSST '72

Dr. Virgilio G. Gayanilo
BSAE '70, MSAE '75, PhD

Mr. Gerardo C. Payumo, Jr.
BSST '80

Dr. Isagani Sarmiento
BSAE '69, MS, PhD

2008
Dr. Francis L. de los Reyes III
BSAE, MS, PhD

Dr. Victor B. Ella
BSAE '82, MS, PhD

Engr. Eugenio C. Castro, Jr.
BSAE 1978, MSAE 1984

Dr. Ricardo L. Cachuela
BSAE, MS, PhD

2007
Dr. Sixto A. Valencia
(Posthumous Service Award)

2006
Dr. Arsenio N. Resurreccion
BSAE '71, MSAE '78, PhD
CEAT Distinguished Alumnus and
UPAA Outstanding Alumnus

2005
Dr. Ernesto P. Lozada
MSAE '70, PhD
CEAT Distinguished Alumnus
and UPAA Outstanding Alumnus

Engr. Rico L. Bautista
BSChE '90

2004
Dr. Eulito U. Bautista
BSAE '79, MS, PhD

2003
Engr. Pantaleon LL. Tabanao
BSAE '67, MSAE '78

2002
Dr. Ernesto P. Lozada
MSAE '70, PhD
UPLBAA Most Distinguished
Alumnus

2000
Dr. Joel L. Cuello
BSAE '84, MS, PhD

1996
Dr. Gloria D. Picar-Jimenez
BSAE '74, MS, PhD

1994
Dr. Ricardo R. del Rosario
BSST '60, MS, PhD

1993
Dr. Wilfredo P. David
BSA '65, MS, PhD

Dr. Virgilio V. Garcia
BSST '62, MS, PhD

1990
Dr. Danielito T. Franco
BSAE '69, MS '73

Dr. Ernesto P. Lozada
MSAE '70

1984
Dr. Reynaldo M. Lantin
BSA '59, MS, PhD
CA Outstanding Alumnus

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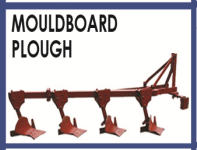
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THE CEAT STUDENT COUNCIL (CEAT-SC)

The CEAT – Student Council, more popularly known as CEAT-SC, is the duly recognized student government in CEAT, UPLB grounded on the principles of service to the students and leadership excellence. Forwarding a genuine brand of participatory action of the students in the college, the CEAT-SC aims to consolidate and involve the students and their respective organizations in the campaigns, activities, events and happenings in the council, the College, and other organizations as well. The council has been at the groundbreaking endeavors advocating the abovementioned principles.

CEAT-SC is composed of 14 CEAT students, with representatives from CEAT-based organizations and non-affiliates. Each member also serves as representatives in CEAT standing committees.

The CEATSC annual activities/projects are:

FRESHURE – the CEAT Freshman Night (includes quiz contest, concert and Team Building activities for New Freshmen

- Academic Tutorials –free tutorials for ES subjects
- Brigada Building B –clean-up of CEAT building B
- CEAT Tune-up games–games between faculty and students in preparation for Palarong UPLB
- Freshman Registration Assistance
- Form 5 distribution assistance
- ES Petitions
- Assisted Enlistment Volunteers
- Support in the Annual Engineering Meet
- CEAT-SC Volunteer Corps
- CEAT Scholarships

The U.P. SOCIETY OF AGRICULTURAL ENGINEERING STUDENTS (UP SAGES)

The U.P. Society of Agricultural Engineering Students (UP SAGES), a pioneer academic organization in College of Engineering and Agro-Industrial Technology, was established in 1966. From its birth up to the present, UP SAGES has kept in its heart and its mind the objective for which the society has been growing, out-reaching, and expanding into the very corner of the university and the society to heed the call for involvement in the varied context of the student life.

Mission

To serve and become involved in the varied context of student life

Vision

To transform individual hopes for unity and cooperation

Activities

- Career Orientation (for BS AE/ABE New Freshmen)
- SAGES Anniversary Week (Exhibit at the CEAT Lobby, Tractor Rodeo, Symposium, Community Service)
- Brain Damage
- Engineering Meet Hosting (2011-2012)
- PAEStigan 2012: An Inter-Luzon State Colleges and Universities PAES Quiz Contest

THE LEAGUE OF AGRICULTURAL ENGINEERING STUDENTS [N.G.]

The League of Agricultural Engineering Students or N.G. was created on September 5, 1975, about three years after the declaration of Martial Law. The League was founded by 18 enthusiastic BSAE students; with their hard work, the League was formed and recognized. The rationale behind the League's existence was the challenge of food production and the problems related to it. The League aims to produce students who are not only trained mentally, emotionally, and physically but also prepared to accept the challenge. The "Proportions of Man" by Leonardo da Vinci symbolizes N.G.'s aspirations. It is not only our symbol; it is also our past, present, and future.

MISSION

Promote academic excellence, camaraderie and render service to the community.

VISION

To inculcate the principles of academic excellence, camaraderie and community service among members.

ACTIVITIES

- NG Symposium
- NG Graduation Party and Induction Night
- eNGotan
- NG Outreach

UPLB SOCIETY OF CHEMICAL ENGINEERING STUDENTS (SChemES)

The UPLB Society of Chemical Engineering Students (UPLB SChemES) is an exclusive academic organization duly recognized by the Department of Chemical Engineering at the University of the Philippines Los Baños. It was founded on September 11, 1986 and from its 20 charter members, the Society grew and became one of the most respected and admired organization not only in the University but in the community as well. The Society has been committed to the pursuit of professional and academic excellence, the enhancement of interactions among university constituents and the advancement of the Philippine community through the application of Chemical Engineering. Since then, the Society has flourished in producing quality resident members dedicated to the pursuit of higher academic learning and to the fulfilment of the Society's objectives and noble goals.

The projects and activities of the UPLB SChemES aim to promote excellence, information sharing, entertainment, camaraderie and help to the Philippine society by making them aware in advancements and applications of the chemical engineering field. Honed by fresh ideas and tested by time, SChemES has conducted original unparalleled activities which has been a pattern to activities of other similar organizations. Through experience, initiative and professionalism, we are able to run numerous activities successfully. These notable activities include Legal Minds: An Inter-department Engineering Debate (now on its 7th year), Meet the Board: A Chemical Engineering Board Forum, Power Quiz – general information quiz contest which is now on its 9th year, Open Tambayan, Virtual Exhibit and Medical Mission.

With the support of the Department of Chemical Engineering, UPLB SChemES achieved a distinct level of recognition with ground breaking and innovative activities. The Society takes pride from its members governed by integrity, character, and traditions of excellence and holistic foundations. As the new demands of time unfurl, UPLB SChemES will continue to strive to the empowerment of its members and to hurdle challenges along the way. It will always do its part for the promotion of the chemical engineering field, upliftment of the roles of its members and service to the community.

UPLB SChemES is an active member of Philippine Institute of Chemical Engineers Junior Chapter-Luzon (PIChE-JCL), a conglomeration of colleges and universities offering BS Chemical Engineering all over Luzon, as well as Philippine Institute of Chemical Engineers - Laguna (PIChE-Laguna).

THE UP ALLIANCE OF CHEMICAL ENGINEERING STUDENTS (UP AChES)

UP Alliance of Chemical Engineering Students (UP AChES) aims to promote academic excellence, service and leadership in industry and society and holistic growth in line with the university and national objectives. Furthermore, we aim to inculcate the university's spirit of free thinking and intellectual leadership, to cultivate the moral well-being, social responsiveness, and cultural sensitivity of each member and to encourage appreciation, camaraderie, and unity among Chemical Engineering students by initiating activities.

UP AChES is actively participating on activities set by the University and College (CEAT) as well. Aside from attending seminars conducted by the Office of Student's Affairs (OSA), UP AChES annually participates in AlmOSAlan and in freshmen convocation wherein food, survival kits and other giveaways are distributed. UP AChES also participates in cheerdancing.

Orientation for chemical engineering students for Org

UPCAT Review: Laguna Wide Edition has reached its 3rd

HeadAChES exclusive for new freshmen chemical engineering

Sports Clinic to harness the skills of members

Career Orientation for chemical engineering students for guidance

Mental Smackdown, a quiz contest for high school students all over NCR-Calabarzon

Anniversary Night and Alumni Homecoming to celebrate the Org's existence

Open Tambayan to give back and extend the celebration outside the org

UP CIVIL ENGINEERING SOCIETY (UPCES)

In 1992, The University of the Philippines at Los Baños introduced the B.S. Civil Engineering program. With the anticipation of the development in the CALABARZON areas (Cavite, Laguna, Batangas, Rizal and Quezon), the College of Engineering and Agro-Industrial Technology (CEAT), offered the curriculum. Thus, two freshman blocks of fifty new high school graduates were enrolled into the program.

As the students of the BS Civil Engineering program go through their life in the university, the need for a support group that will help them attain their goals arises. And in 1993, after a long period of rigid discussions, the University of the Philippines Civil Engineering Society or simply UPCES was established on August 2. On July 17. 1994, under the approval of the Office of Student Affairs (OSA), Up's governing body for student activities, UPCES has joined other academic organizations recognized by the university. With twenty seven (27) charter members to uphold the organization's constitution, UPCES began to aim for its goal and objectives – to promote brotherhood, attain academic excellence and build the foundation of the future civil engineer.

Mission:
To provide stimulating learning environment for future civil engineers that are capable enough to attend the needs of the Philippines and the Filipino people.

Vision:
Is to be a world-known academic organization that is able to produce well-built civil engineers which will contribute to the social and economical development of the Philippines.

Goals:
UPCES was established to attain academic excellence, to promote the principles of the organization among its constituents, to build and fortify a foundation for future civil engineers, to protect the rights and welfare of the members of the organization, and to create an integrative and harmonious relationship within the organization, among other organizations, and among the constituents of the University.

The **University of the Philippines Civil Engineering Society (UPCES)**, a duly recognized academic organization, has been persistent in attaining its objectives of promoting academic excellence and developing camaraderie among fellow students. As one of the University's premiere organization, we take pride in producing board topnotchers since the establishment of the CE Department in 1992 and 100% board passers for the majority of its duration. This only proves our strength and determination in pursuing high academic standards in which the organization has been known for. Our activities include:

Colloquia 2012
Colloquia 2012 is an annual academic seminar of the organization in which topics are discussed by 'big' engineers in the industry with this year's theme **"Understanding the Latest Developments in Structural Engineering Codes and Guidelines".** The seminar aims to bridge the gap between theoretical study and practical application in the field of civil engineering. Engineering students from different universities will be invited in this seminar.

Film showing/Roadshow
In recognition of the role to educate and nurture the future builder of our world, the organization together with the School for Environmental Science and Management (SESAM) will be hosting an annual film showing activity that showcases environmental awareness and preservation. The activity aims to awaken other people's mind on their responsibilities on our environment. The organization will also be hosting a film showing activity on different high schools and universities nationwide. This activity started since 2008 with the goal of spreading environmental awareness to the youth.

The CIVIL ENGINEERING EXECUTIVE ORGANIZATION (CEO)

The Civil engineering Executive Organization (CEO) is a duly recognized academic organization based in the College of Engineering and Agro-Industrial Technology (CEAT) at the University of the Philippines Los Baños, known for existing gloriously for the past 12 years. The organization holds and participates in activities within the college and university and even reaches out for those outside the campus. At the same time, it also fosters harmony and mutual understanding and maintains academic excellence among its members.

History

On the 29th of June 2000, Engr. Raymond delos Santos, Engr. John Raymond Dequina, Engr. Charlemagne Cruz and Mr. Oliver Vincent Cutamora founded the organization with the belief that there is a need for an organization that would make a difference in the field of Civil Engineering. With the help of Dr. Jean Loyola and Prof. Rolando Maningas, the founders, together with the 19 charter members, established CEO with the hopes of molding its present and future members into becoming socially responsible engineers of great value to the society. True to its word, the Organization continues to strive for excellence in all of its endeavors, academic or non-academic.

Mission

The organization shall promote academic and professional excellence in all of its endeavors and develop its members' potentials to mold them into socially responsible engineers.

Vision

The organization shall be a leading organization which will provide training, knowledge and service university wide.

UPLB SOCIETY OF ELECTRICAL ENGINEERING STUDENTS (UPLB SELES)

The UPLB Society of Electrical Engineering Students (UPLB SELES) is a duly recognized academic organization based on the College of Engineering and Agro-Industrial Technology (CEAT) of the University of the Philippines Los Baños. Founded in 1998, the UPLB SELES is the first and only academic organization in UPLB that is exclusive for undergraduate BS Electrical Engineering students. The UPLB SELES started with just 15 members and has grown and produced more than 200 graduates. Today, the organization stands strong with about 70 active resident members.

UPLB SELES is a member of the Regional Council of Student Chapters Region IV (RCSC), a national student arm of the Institute of Integrated Electrical Engineers of the Philippines Inc. (IIEE) to establish cooperative linkages with EE students for the enhancement of the standards of Electrical Engineering instruction and quality of EE graduates.

The organization's mission is to instill the ideals of academic excellence, leadership, discipline and harmonious relationship among its members while promoting goodwill and well-being to serve as models with the other sectors of the society in further achieving of a noble commitment to serve humanity in truth justice, liberty and equality.

The organization's vision is to contribute to the advancement of humanity towards the sustained and balanced development of the nation and the global community through the promotion of science and technology through electrical engineering.

Furthermore, the organization aims to promote the intellectual, moral, social and physical development among its members. It is also our goal to instill and develop unity, camaraderie and equality among its members and other sectors of the society. In addition, it is our duty to take active part in activities that uphold the organization's principles.

UPLB SELES utilizes the following activities annually to pursue its goals in community service and contribution to the advancement of humanity through electrical engineering:

- OutrEEach Program – to serve those in need in order to improve humanity and to give back the blessings that the organization and its members have been receiving.
- Exhibit – presents the organization's profile, activities and accomplishments that highlights the anniversary theme
- SemEEnar - talks about topics related to the organization's anniversary theme with its key resource speakers usually coming from the academe and major sponsors
- Open Tambayan – to ensure good public relations and harmonious relationship with other organizations and sectors of the society
- squEEze ur mind - is a biannual team quiz contest for engineering students currently enrolled in the EE 1 (Basic Electrical Engineering) course
- wEEzards - to promote the organization by creating an open interaction and camaraderie with other student organizations and students of the University

UP ENGINEERING RADIO GUILD – LOS BAÑOS (UP ERG-LB)

The **UP Engineering Radio Guild-Los Baños (UP ERG-LB)** is a duly recognized academic organization in the Department of Electrical Engineering, College of Engineering and Agro-Industrial Technology (CEAT) in the University of the Philippines Los Banos. The organization branched out from the UP ERG in the University of the Philippines Diliman (UPD) on December 2004. It actively promotes the holistic development of its members, being excellent not only in academics but also in people skills – a valuable quality of leaders. It also exemplifies service through various academic and social projects, further increasing the consciousness on the power of collective action in bringing positive change not only in the university but also in the community.

The organization's annual activities include *sinEEng'g*, a Laguna-wide Mathematics and Physics high school quiz contest; *icebERG*, a logic-based quiz contest for UPLB students; *emERGe*, an annual newsletter featuring the achievements and activities of the organization; *ERGshaker*, an inter-organization Dota-tournament that aims to promote camaraderie among CEAT students; *ERG Gives Love*, a gift-giving activity every December for elementary students in public schools around Los Banos; symposiums or seminars; and exhibit regarding technologies in Electrical Engineering.

VISION: To be a student conglomerate that continuously raises the bar for others, through humility in selfless service and excellence through academic distinction

MISSION: To be a socio-politically aware and academically inclined organization, fostering the holistic growth of its members, and constantly elevating standards and exemplifying the student body with an enhanced communication and interaction among the students, faculty and staff through the promotion of university-wide academics and social well-being

AIMS:

1. To promote the academic and social well-being of the EE studentry in U.P.
2. To provide an atmosphere of mutual understanding within the EE community.
3. To enhance communication among EE students, and between the EE studentry and faculty.
4. To aid in the development of the country through the advancement of the fields in Electrical Engineering.
5. To provide a venue for the holistic development of the members of the organization.
6. To contribute in the improvement and social welfare of the community.

The UNIVERSITY OF THE PHILIPPNES LOS BAÑOS INDUSTRIAL ENGINEERING STUDENTS' ORGANIZATION (UPLB IESO)

The University of the Philippines Los Baños Industrial Engineering Students' Organization, or UPLB IESO for short, is an academic organization of BSIE students was established on November 26, 2001 and was officially recognized on August 21, 2004.

UPLB IESO's mission is to propagate the interests and endeavors of Industrial Engineering in the community, the society, and the country through the knowledge gained in the field of Industrial Engineering. UPLB IESO's vision is a united body of Industrial Engineering students of the University of the Philippines Los Baños promoting and upholding academic excellence as well as camaraderie within them. In its ten years of service, the organization has benchmarked several activities that were set to meet the needs of the Industrial Engineering Department and of the whole Industrial Engineering community of UPLB. Inspired with the principles of Industrial Engineering, the organization makes it a point to plan, execute, evaluate and improve these activities the way Industrial Engineers do it. Some of the activities of the organization are as follows: Student-Faculty Meeting, IE Plant Tour, Practicum Awareness Seminar, and the Southern Tagalog Industrial Engineering Seminar (STIES).

Student –Faculty Meeting. This is an annual activity initiated by the organization in cooperation with the Department of Industrial Engineering. This activity aims to introduce the Industrial Engineering profession to freshman students especially those who are still confused and undecided of what path to take. Aside from the purpose of knowledge sharing, this activity also aims to maintain students' interest of the Industrial Engineering profession.

Practicum Awareness Seminar. This activity was done in order to orient the senior students who chose practicum study instead of thesis about what they will be doing. This activity was attended by the UPLB IE senior students and the IE faculty.

IE Plant Tour. It is a joint project of the UPLB IESO and the Department of Industrial Engineering that promotes practical learning. The first IE Plan tour was conducted last **February 25, 2011** and was attended by UPLB IE students taking up IE 191 (IE Special Problems), IE 181 (Systems Simulation), and IE 150 (Systems Evaluation). The purpose of this tour is to orient the IE students to company operations and to provide the students with real-life scenarios of the concepts and principles taught in many Industrial Engineering subjects. Realizing the goodness that this activity offers to the students, it has been the vision of the organization to conduct IE Plant Tour regularly.

Southern Tagalog Industrial Engineering Seminar (STIES). This annual event aims to unite all Industrial Engineering students in the Southern Tagalog region and indulge in talks and forums to enrich their knowledge and further acquaint them with Industrial Engineering. With a chosen topic for discussion, reputable speakers from different fields and industries were invited to speak amongst six hundred young and bright minds of the Southern Tagalog Region. Last September 1, 2012, the fourth STIES was held at the D.L. Umali Auditorium, with the theme "Delving into the Intricacies of Technology-based Entrepreneurship".

ALLIANCE OF INDUSTRIAL ENGINEERING MAJORS – UNIVERSITY OF THE PHILIPPINES (AIEM-UP)

Realizing the many advantages of being organized in pursuit of common ideals and upholding and living by its core values; as well as instilling corporate outlook among its members, the ALLIANCE OF INDUSTRIAL ENGINEERING MAJORS - UNIVERSITY OF THE PHILIPPINES (AIEM-UP) was established on June 21, 2011. It was first duly recognized by the University through the Office of Student Affairs - Students Organizations and Activities Division (OSA-SOAD) on the first (1st) semester of the academic year 2012-2013 as an academic organization for BS in Industrial Engineering students.

Vision/Mission

AIEM-UP strives to shape a well-rounded Industrial Engineering Major by enhancing and equipping them with the necessary skills through its activities. The organization upholds academic excellence and promotes a corporate outlook and practice among its members while it explores the connection of Industrial Engineering to other fields by seeking its applications and links.

Activities

- Study Groups
- Personality Development Workshops
- IE and Beyond*: Exploring the field of Industrial Engineering and its links and application to the community (A seminar-workshop)
- Intra-org Plant Visits
- Community Development Immersions

UPLB ENGINEERING SOCIETY (UP ENGSOC)

History

The UPLB Engineering Society is a duly recognized organization in the College of Engineering and Agro-Industrial Technology at the University of the Philippines Los Baños. It was founded on July 5, 2012 by six Electrical Engineering students.

Mission

Our mission is to develop a sense of academic excellence, altruistic attitude towards leadership and service and compassion towards fellowship among its members.

Vision

UPLB Engineering Society's vision to be an organization producing future engineers that excel academically, committed leaders and altruistic servicemen to their community.

Some of the activities:

- PagalENGan at SOCatan ng Talino - a quiz contest open to all registered UPLB students that includes questions about GE (General Education) subjects in UPLB and some additional questions of luck

- Outreach – an activity which involves socio-civic works outside community

UNIVERSITY OF THE PHILIPPINES ENGINEERING STUDENTS' GUILD (UPESG)

The **University Of The Philippines Engineering Students' Guild (UPESG)** geared to existence by twenty-seven engineering students on March 15, 1996. For sixteen exceptional years, UPESG has been advocating for excellence, service and grandeur in every step on its stupendous voyage. Our organization has been consistent in pursuing leadership, developing unity, and establishing camaraderie within and outside the organization and the university.

MISSION: By uniting each member, we aim to uphold academic excellence, inculcate responsible and lasting camaraderie and pursue leadership and service, thus, contribute to the country's development.

VISION: An organization known for advocating excellence, service, grandeur and most of all producing engineers equipped with competent leadership skills.

Annual Activities:

ENGsayo!: UPCAT Review (August)

Eng-Eng Quiz: Quiz Con of Jokes (September)

Ulimatong Paligsahan sa Esep, sa Salita at sa Gawa: Inter-High School Quiz, Essay Writing and Poster Making Contests (November)

ENSCyo!: Engineering Science Tutorials (December)

ES Gyera: Inter-Engineering Department Quiz Contest

ESG Month – Libreng Sakay, Open Tambayan, Exhibit and Symposium (February)

Engineering Job Fair (February)

ESG Community Service (March)

ES General Cleaning (April)

UP BROTHERHOOD OF NOBLE ENGINEERS (UP BNE)

Formed on 2005, and formally organized on July 6, 2006, the UP Beta Nu Epsilon Fraternity, which stands for the Brotherhood of Noble Engineers, aims to serve its mother college in any way humanly possible, as well as uniting all true male engineering students in the university, transcending the borders of the traditional engineering academic organizations.

With the Motto of "Suaviter in Modo, Fortiter in Re", which means, Gently in Manner, Strongly in Deed, the fraternity is humbly making its presence and strength felt within the college, proving to all students that its existence has a purpose, and its nobility has a reason.

UP SISTERHOOD OF NOBLE ENGINEERS (UP SNE)

The UP Sigma Nu Epsilon Sorority, which stands for the Sisterhood of Noble Engineers, aims to serve its mother college in any way humanly possible, as well as uniting all true female engineering students in the university, transcending the borders of the traditional engineering academic organizations.

With the Motto of "La Belle Dame De L'Excellence", which means, Beautiful Lady of Excellence, the Sorority is humbly making its presence and strength felt within the college, proving to all students that its existence has a purpose, and its nobility has a reason.

KOLEHIYONG MAHAL
(CEAT HYMN)

Kolehiyong mahal
Tahanan ng dangal
Luklukan ng kagalingan
Karunungan, kadakilaan
Pamantayang tunay
Humuhubog ng
Kadalubhasaan

Inhinyerong laan
Para sa bayan
Katuwang sa disenyo ng kinabukasan
Kaisa sa layuning pangkaunlaran
Pamantasang hirang
Iyong itatanyag
Pinagpala ng Diyos na Dakila
Manguna sa iba't ibang bansa

Mabuhay ka, mabuhay ka
CEAT mabuhay ka!*
CEAT mabuhay ka!