



MINDANAO STATE UNIVERSITY - MAIN CAMPUS
COLLEGE OF ENGINEERING
MARAWI CITY - 9700



BACHELOR OF SCIENCE IN
AGRICULTURAL AND BIOSYSTEMS ENGINEERING
COURSE CATALOG

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COURSE DESCRIPTION

VISION

Mindanao State University

The MSU System aspires to be a Center of Excellence in Instruction, Research and Extension transforming itself into a premier and globally competitive national peace university.

MISSION

Mindanao State University

The MSU System is committed to:

- 1» Lead in social transformation through peace education and integration of the Muslims and other cultural minority groups into the mainstream society;
- 2» Ensure excellence in instruction, research development, innovation, extension, and environmental education and discovery;
- 3» Advance national and international linkages through collaborations and,
- 4» Demonstrates greater excellence, relevance, and inclusiveness for Mindanao and the Filipino nation.

GOALS

College of Engineering

- 1» To provide and maintain quality engineering education in the MINSUPALA region;
- 2» To conduct technological research with emphasis on addressing the problems, needs, and development of the region;
- 3» To adopt, develop, and improve technologies that can be made economically viable using local resources; and
- 4» To provide extension services through technical assistance

OBJECTIVES

Department of Agricultural and Biosystems Engineering

- 1» To produce globally-competitive graduates in the field of Agricultural and Biosystems Engineering
- 2» To develop Agricultural and Biosystems Engineering students with competencies in soil and water engineering, postharvest technology, farm structures, farm mechanization, environmental protection, biosystems engineering and precision agriculture.
- 3» To sustain a quality number of faculty members in the department
- 4» To develop faculty members academically, professionally, and other continuous lifelong learning activities
- 5» To develop quality BS Agricultural and Biosystems Engineering curriculum through OBEE framework
- 6» To develop quality laboratory facilities and equipment relevant to instruction, research, and extension functions of the Department
- 7» To conduct researches and develop technologies related to the ABE profession that are globally and locally relevant especially to the BARMM as well as to the rest of the MINSUPALA
- 8» To extend expertise and developed-technologies to local communities and other areas of service of the University
- 9» To develop and sustain linkages to local and foreign agencies, NGOs, LGUs, as well as private companies

PROGRAM EDUCATIONAL OBJECTIVES

BS Agricultural and Biosystems Engineering

- 1 Demonstrate expertise in ABE through leadership, innovation, and ethical responsibility to promote sustainable development and address global challenges
- 2 Excel in leadership or managerial roles in public and private sectors, or initiated and managed ABE-related enterprises
- 3 Advance their knowledge and skills through lifelong learning, higher studies, and professional development, contributing to the continuous progress of agricultural and biosystems engineering.

PROGRAM OUTCOMES

BS Agricultural and Biosystems Engineering

- a Apply knowledge of mathematics, physical, life, and information sciences; and engineering sciences appropriate to agricultural and biosystems engineering;
- b Conduct appropriate experimentation, analyse and interpret data, and use engineering judgment to draw conclusions;
- c Apply both analysis and synthesis in the engineering design process, resulting in designs that meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability, in accordance with standards;
- d Identify, formulate and solve complex problems in agricultural and biosystems engineering;
- e Understand the impact of engineering solutions in global, economic, environmental, and societal context;
- f Recognize the need for additional knowledge and locate, evaluate, integrate, and apply this knowledge appropriately;
- g Apply techniques, skills, and modern engineering tools necessary for agricultural and biosystems engineering practice;

-  Demonstrate knowledge and understanding of engineering and management principles as a member and/or leader in a team to manage projects in multidisciplinary environments;
-  Keep abreast of the latest development in the specific field of practice;
-  Effectively communicate using English and Filipino, orally and in writing;
-  Work effectively and independently in multi-disciplinary and multi-cultural teams (PQF Level 6 descriptor);
-  Exemplify professional, social, ethical, and environmental responsibility;
-  Preserve and promote “Filipino historical and cultural heritage”;
-  Advocate for peace in multi-cultural settings;
-  Generate new knowledge in the form of research or developmental projects to support national, regional, or local development plans

CHAIRPERSON

ENGR. YSMAEL ALONGAN B. MANGORSI

- **MS in River and Environments and their Management**
University of Birmingham, Birmingham, United Kingdom
- **BS in Agricultural Engineering Major in Agricultural Power and Machinery**
University of the Philippines Los Baños

FACULTY

ENGR. SAANODING A. BALAYO

- **PhD in Agricultural Engineering Major in Soil and Water Management (CAR)**
Central Luzon State University
- **MS in Farming Systems**
Mindanao State University - Main Campus
- **BS in Agricultural Engineering**
Mindanao State University - Main Campus

ENGR. NORAISAH P. CASIM

- **MS Agricultural Engineering Major in Agricultural and Bio-Processing (CAR)**
University of the Philippines Los Baños
- **Certificate in Statistics (CAR)**
Mindanao State University - Main Campus
- **BS in Agricultural Engineering**
Mindanao State University - Main Campus

ENGR. RAKIM B. CASNOR

- **MS in Agricultural Engineering Major in Agricultural Machinery**
Central Luzon State University
- **BS in Farming Systems (CAR)**
Mindanao State University - Main Campus
- **BS in Agricultural Engineering**
Mindanao State University - Main Campus

ENGR. ROHAIMA A. DIANGCA

- **MS in Farming Systems**
Mindanao State University - Main Campus
- **BS in Agricultural Engineering**
Mindanao State University - Main Campus

ENGR. STELLA A. LAMBAN

- **MS in Agricultural Systems and Engineering (On going)**
Asian Institute of Technology, Thailand
- **MS in Industrial Engineering Technology (CAR)**
Mindanao State University - Main Campus
- **BS in Agricultural Engineering**
Mindanao State University - Main Campus

ENGR. SHIELA G. MAGOLAMA, PH.D

- **PhD in Agricultural Engineering Major in Soil and Water Management**
Central Luzon State University
- **MS in Agricultural Engineering Major in Soil and Water Management**
Central Luzon State University
- **BS in Agricultural Engineering**
University of Southern Mindanao

ENGR. MUJAHIDAH AMEENAH D. SHARIEF

- **MS in Farming Systems (CAR)**
Mindanao State University - Main Campus
- **Certificate in Governmental Management**
Mindanao State University - Main Campus
- **BS in Agricultural Engineering**
Mindanao State University - Main Campus

ENGR. NABIL D. SULTAN, M.SC.

- **MS in Agricultural Engineering Major in Agricultural, Food and Bio-Processing Engineering**
University of the Philippines Los Baños
- **BS in Agricultural Engineering**
Mindanao State University - Main Campus

ENGR. SITTIE FARHANI P. USMAN

- **MS in Agricultural Engineering Major in Agricultural, Food and Bio-Processing Engineering**
University of the Philippines Los Baños
- **BS in Agricultural Engineering**
Mindanao State University - Main Campus

FACULTY

MSU-MAIN CAMPUS SINDANGAN EXTENSION

ENGR. DEXCELL RAVE C. BAYOBAY

- **BS in Agricultural Engineering**
Mindanao State University - Main Campus

ENGR. JOHN REIH B. LESMONERO

- **BS in Agricultural Engineering**
Mindanao State University - Main Campus

ENGR. MICHAEL JOHN B. PAGALAN

- **BS in Agricultural Engineering**
Central Mindanao University

STAFF

MACATINGKI T. BAROSA

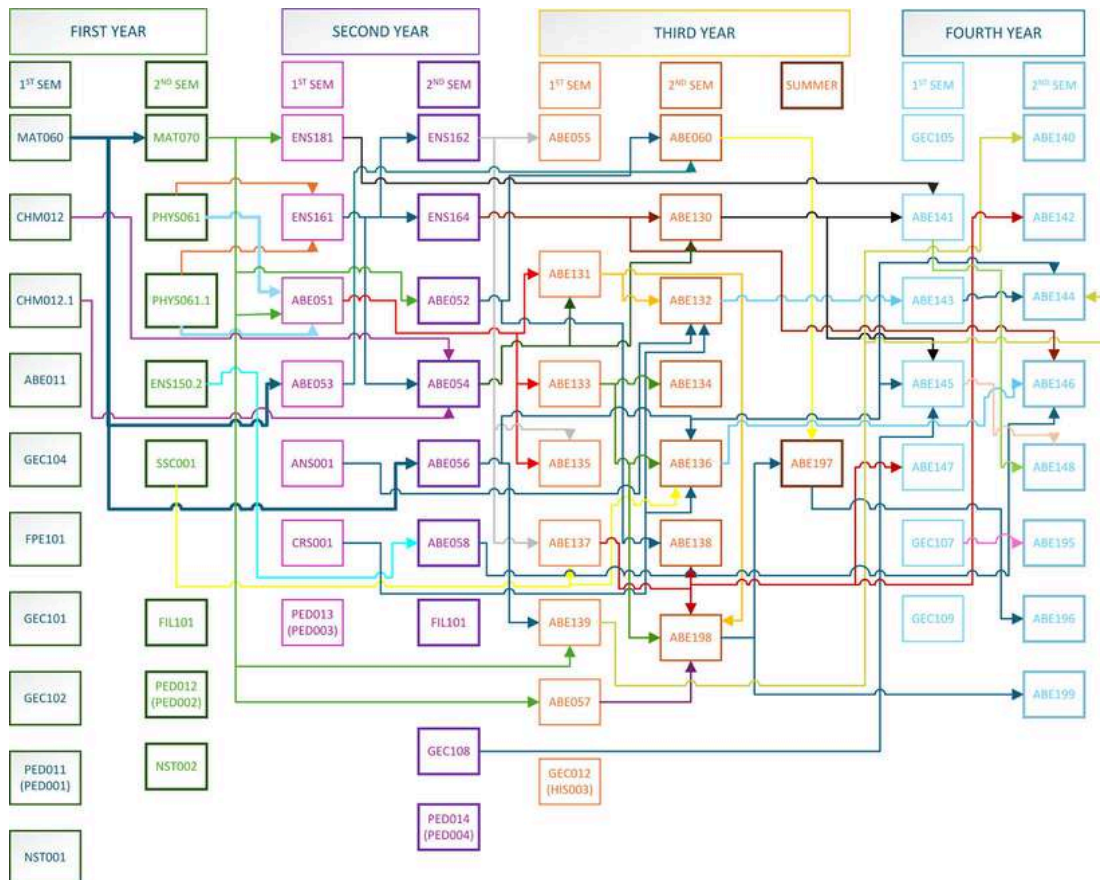
- **AB POLITICAL SCIENCE**
Jamiatul Philippine Al-Islamia, Marawi City
- **DET ELECTRICAL TECHNOLOGY**
Mindanao State University - Main Campus

DEVINE GRACE C. OFQUERIA

- **BS COMMUNITY DEVELOPMENT**
Mindanao State University - Main Campus

CURRICULUM MAP

BS Agricultural and Biosystems Engineering



SUMMARY OF UNITS BY SEMESTER

BS Agricultural and Biosystems Engineering

YEAR LEVEL	SEMESTER	UNITS
First Year Level	1 st Semester	23
	2 nd Semester	24
Second Year Level	1 st Semester	22
	2 nd Semester	24
Third Year Level	1 st Semester	22
	2 nd Semester	21
	Summer	6
Fourth Year Level	1 st Semester	21
	2 nd Semester	21
Total Units:		184

SUMMARY OF COURSES AND UNITS

BS Agricultural and Biosystems Engineering

GENERAL EDUCATION COURSES		UNITS
GEC101	Understanding the Self	3
GEC102	Purposive Communication	3
GEC103	The Contemporary World	3
GEC104	Mathematics in the Modern World	3
GEC105	Readings in Philippine History	3
GEC106	Art Appreciation	3
GEC107	Ethics	3
GEC108	Science, Technology and Society	3
GEC109	Life and Works of Rizal	3
HIS003	History of Filipino Muslims and the Indigenous People of MINSUPALA	3
FIL101	Wika at Kultura sa Mapayapang Lipunan	3

FIL102	Ekokritisismo at Pagpapahalaga sa Kalikasan	3
FPE101	Fundamentals of Peace Education	3
PHYSICAL EDUCATION AND NSTP COURSES		UNITS
PED001	Exercise Prescription and Management	2
PED002	Dance or Martial Arts	2
PED003	Individual/Dual Sports	2
PED004	Team Sports	2
NST001	National Service Training Program 1	-
NST002	National Service Training Program 2	-
MATHEMATICS AND PHYSICAL SCIENCE COURSES		UNITS
MAT060	Calculus with Analytic Geometry I	4
MAT070	Calculus with Analytic Geometry II	4
PHY061	Physics I	3
PHY061.1	Physics I Laboratory	1

CHM012	Chemistry for Engineers	3
CHM012.1	Chemistry for Engineers Laboratory	1
BASIC AGRICULTURAL SCIENCE COURSES		UNITS
CRS001	Principles of Crop Production	3
SSC001	Principles of Soil Science	3
ANS001	Introduction to Animal Science	3
COMMON ENGINEERING COURSES		UNITS
ENS150.2	Engineering Graphics	2
ENS161	Statics of Rigid Bodies	3
ENS162	Dynamics of Rigid Bodies	3
ENS164	Mechanics of Deformable Bodies	3
ENS181	Engineering Mathematics	3
BASIC/CORE ENGINEERING COURSES FOR ABE		UNITS
ABE011	Introduction to AB Engineering	3

ABE051	Thermodyn. and Heat Transfer for ABE	5
ABE052	Computer Applications for ABE	3
ABE053	Surveying for ABE	3
ABE054	Materials and Processes for ABE	3
ABE055	Kinematics of Machine Elements for ABE	1
ABE056	AB Engineering Economy	3
ABE057	AB Engineering Data Analysis	3
ABE058	Computer-Aided Design (CAD) for ABE	1
ABE060	GIS and Spatial Analysis	3
PROFESSIONAL COURSES		UNITS
ABE130	AB Structures Engineering	3
ABE131	Properties of AB Materials	3
ABE132	AB Products Processing and Storage	3
ABE133	AB Power and Energy Sources	3

ABE134	Renewable Energy for AB Applications	3
ABE135	Fluid Mechanics for ABE	3
ABE136	AB Machinery and Mechanization	3
ABE137	Hydrometeorology	3
ABE138	Irrigation and Drainage Engineering	3
ABE139	AB Engineering Management	3
ABE140	Technopreneurship for ABE	3
ABE141	AB Electrification and Control System	3
ABE142	Aquaculture Engineering	3
ABE143	Food Process Engineering	3
ABE144	Design and Mgmt. of AB Processing	3
ABE145	AB Waste Management Engineering	3
ABE146	Machine Design for AB Production	3
ABE147	Land and Water Conservation Engg.	3

ABE148	Plant and Livestock Systems and Environmental Control Engineering	3
ABE195	ABE Laws, Contracts, Specs, & Ethics	2
ABE196	Undergraduate Seminar	1
ABE197	Industry Immersion Program (Practicum)	6
ABE198	Research Methods for AB Engineering	3
ABE199	Undergraduate Thesis	3

COURSE DESCRIPTION

BS Agricultural and Biosystems Engineering

GEC101: **UNDERSTANDING THE SELF**

The course deals with the nature of identity, as well as the factors and forces that affect the development and maintenance of personal identity. The directive to know Oneself has inspired countless and varied ways to comply. Among the questions that everyone has had to grapple with at one time or other is “Who am I?” At no other period is this question asked more urgently than in adolescence—traditionally believed to be a time of vulnerability and great possibilities. Issues of self and identity are among the most critical for the young. This course is intended to facilitate the exploration of the issues and concerns regarding self and identity to arrive a better understanding of one’s self. It strives to meet this goal by stressing the integration of the personal with the academic—contextualizing matters discussed in the classroom and in the everyday experiences of students – making for better learning, generating a new appreciation for the learning process, and developing a more critical and reflective attitude while enabling them to manage and improve their selves to attain a better quality of life.

The course is divided into three major parts: The first part seeks to understand the construct of the self from various disciplinary perspectives: philosophy, sociology, anthropology and psychology – as well as the more traditional division between the East and West – each seeking to provide answer to the difficult but essential question of “What is the self?” And raising among others the question: “Is there even such a construct of the self?” The second part explores some of the various aspects that make up the self, such as the biological and material up to and including the more recent Digital Self. The third and final part identifies the three areas of concern for young students: learning, goal setting, and managing stress. It also provides for the more practical application of the concepts discussed in this course and enables them the hands-on experience of developing self-help plans for self-regulated learning, goal setting, and self care. This course includes the mandatory topics on Family Planning and Population Education.

GEC102:

PURPOSIVE COMMUNICATION

Purposive Communication is a 3-unit course that develops students' communicative competence and enhances their cultural and intercultural awareness through multimodal tasks that provide them opportunities for communicating effectively and appropriately to a multicultural audience in a local or global context.

It equips students with tools for critical evaluation of a variety of texts and focuses on the power of language and the impact of images to emphasize the importance of conveying messages responsibly.

The knowledge, skills, and insights that students gain from this course may be used in their other academic endeavors, their chosen disciplines, and their future careers as they compose and produce relevant oral, written, audio-visual, and/or web-based output for various purposes.

GEC103:

THE CONTEMPORARY WORLD

This course introduces students to the contemporary world by examining the multifaceted phenomenon of globalization. Using the various disciplines of the social sciences, it examines the economic, social, political, technological, and other transformations that have created an increasing awareness of the interconnectedness of the peoples and places around the globe.

To this end, the course provides an overview of the various debates in global governance, development, and sustainability. Beyond exposing the student to the world outside the Philippines, it seeks to inculcate a sense of global citizenship and global ethical responsibility. This course includes mandatory topics on population education in the context of population and demography.

GEC104:

MATHEMATICS IN THE MODERN WORLD

Nature of Mathematics, appreciation of its practical, intellectual, and aesthetics dimensions and application of mathematical tools in daily life. The course begins with an introduction to the nature of mathematics as an exploration of patterns (in nature and environment) and as an application of inductive and deductive reasoning. By exploring these topics, students are encouraged to go beyond the typical understanding of mathematics as merely a set of formulas but as a source of aesthetics in patterns of nature, for example, and a rich language in itself (and of science) governed by logic and reasoning.

The course then proceeds to survey ways in which mathematics provides a tool for understanding and dealing with various aspects of present-day living such as managing personal finances, making social choices, appreciating geometric designs, understanding codes used in data transmission and security, and dividing limited resources fairly. These aspects will provide opportunities for actually doing mathematics in a broad range of exercises but bring out the various dimensions of mathematics as a way of knowing, and test the students' understanding and capacity.

GEC105:

READINGS IN PHILIPPINE HISTORY

Philippine History aims to expose students to different facets of Philippine history through the lens of eyewitness. Rather than rely on secondary materials such as textbooks, which is the usual approach in teaching Philippine history, different types of primary sources will be used – written (qualitative and quantitative), oral, visual, audio-visual, digital – covering various aspects of Philippine life (political, economic, social, cultural). Students are expected to analyse the selected readings contextually and in terms of content (stated and implied). The end goal is to enable students to understand and appreciate our rich past by deriving insights from those who were actually present at the time of the event.

Context analysis considers the following: (i) the historical context of the source (time and place it was written and the situation at the time), (ii) the author's background, intent (to the extent discernable), and authority on the subject, and (iii) the source's relevance and meaning today.

Content analysis, on the other hand, applies appropriate techniques depending on the type of source (written, oral, visual). In the process, students will be asked, for example, to identify the author's main argument or thesis, compare points of view, identify biases, and evaluate the author's claim based on the evidences presented or other available evidence at the time. The course will guide the students through their reading and analysis of the texts and require them to write reaction essays of varied length and present their ideas in other ways (debate format, power point presentation, letter to the editor of the source, etc.).

The instructor may arrange the readings chronologically or thematically, and start with the present (more familiar) and go back to the earlier periods or vice-versa.

GEC106:

ART APPRECIATION

Art Appreciation is a 3-unit course that develops students' ability to appreciate, analyze, and critique works of art through interdisciplinary and multimodal approaches. This course equips students with a broad knowledge of the practical, historical, philosophical, and social relevance of the arts in order to hone their ability to articulate their understanding of the arts.

The course also develops students' competency in researching and curating art as well as conceptualizing, mounting, and evaluating art productions. It aims to develop students' genuine appreciation for Philippine Arts by providing them opportunities to explore the diversity and richness of the arts and their rootedness in Filipino culture.

GEC107:

ETHICS

Ethics deals with principles of ethical behaviour in modern society at the level of the person, society, and in interaction with the environment and other shared resources. Morality pertains to the standards of right and wrong that an individual originally picks up from the community. The course discusses the context and principles of ethical behaviour in modern society at the level of individual, society, and in interaction with the environment and other shared resources. It also teaches students to make moral decisions by using dominant moral frameworks and by applying a seven-step moral reasoning model to analyse and solve moral dilemmas. The course is organized according to the three (3) main elements of the moral experience: (a) agent, including context – cultural, communal, and environmental; (b) the act; and (c) reason or framework (for the act). The course includes the mandatory topic on taxation.

GEC108:

SCIENCE, TECHNOLOGY AND SOCIETY

The course deals with interactions between science and technology and social, cultural, political, and economic contexts that shape and are shaped by them. This interdisciplinary course engages students to confront the realities brought about by science and technology in society. Such realities pervade the personal, the public, and the global aspects of our living and are integral to human development. Scientific knowledge and technological development happen in the context of society with all its socio-political, cultural, economic, and philosophical underpinnings at play.

This course seeks to instill reflective knowledge in the students so that they are able to live the good life and display ethical decision-making in the face of scientific and technological advancement. The course includes mandatory topics on climate change and environmental awareness.

GEC109:

LIFE AND WORKS OF RIZAL

A study of the life and works of Dr. Jose Rizal in the context of the formation of Filipino nationalism, its relevance and application on the continuing problems in the contemporary Philippines.

HIS003:

HISTORY OF FILIPINO MUSLIMS AND THE INDIGENOUS PEOPLE OF MINSUPALA

This course provides a historical overview of the Filipino Muslims and the Indigenous Peoples of Mindanao, the Sulu Archipelago, and Palawan (MinSuPala) from pre-colonial times to the present. It highlights their responses to foreign and local domination that threatened their existence and survival.

The course also emphasizes the significance of the peoples' stories in MinSuPala within the broader context of Philippine history.

FIL101:

WIKA AT KULTURA SA MAPAYAPANG LIPUNAN

Ang kursong ito ay kritikal na pag-aaral sa ugnayan ng wika at kultura tungo sa mapayapa at maunlad na pamumuhay sa lipunan gamit ang pambansang wikang Filipino.

FIL102:

EKOKRITISISMO AT PAGPAPAHALAGA SA KALIKASAN

Nakalaan sa mga napapanahong usapin sa wika at panitikan na tumatalakay sa paggalang sa kalikasan at kapaligiran sa iba't ibang panahon at pook sa Pilipinas.

FPE101:

FUNDAMENTALS OF PEACE EDUCATION

This course is a peace-in-action or action-based discipline for which a holistic, multi, and trans-disciplinary approach is adopted. It intends to produce students who are peace-loving, change accelerators or agents of positive change, peace advocates, and champions to establish or build a culture of peace.

PED001:

EXERCISE PRESCRIPTION AND MANAGEMENT

This course provides competencies to assess, prescribe, design, apply, monitor, and evaluate individual exercise programs for health and fitness development. Students will integrate fitness behavior to meet the demands of an active and healthy lifestyle.

PED002:

DANCE OR MARTIAL ARTS

This course provides competencies in various dance genres for relevant social and exercise activities, as well as promotes cultural awareness, appreciation, and preservation. This course also provides competencies in various martial arts disciplines for lifelong skills in health, fitness, and protection, while promoting cultural awareness, and preservation for lifelong physical activity and healthy living.

PED003:

INDIVIDUAL/DUAL SPORTS/TRADIT/RECREATIONAL GAMES

This course provides competencies to participate in physical activity as an individual or with a partner in pursuit of health and wellness. Students can choose from a wide range of individual and dual sports, traditional games, and outdoor sports for lifelong physical activity and healthy living.

PED004:

TEAM SPORTS

This course provides competencies to participate in physical activity as an individual or with a partner in pursuit of health and wellness. Students can choose from a wide range of individual and dual sports, traditional games, and outdoor sports for lifelong physical activity and healthy living.

NST001:

NATIONAL SERVICE TRAINING PROGRAM 1

This course is pursuant to RA 9163 mandating students in the college level to render service to the community. Students can choose from any of the three components: Civic Welfare Training Service (CWTS), Reserve Officers' Training Corps (ROTC), or Literacy Training Service (LTS).

NST002:

NATIONAL SERVICE TRAINING PROGRAM 2

This course is pursuant to RA 9163 mandating students in the college level to render service to the community. Students can choose from any of the three components: Civic Welfare Training Service (CWTS), Reserve Officers' Training Corps (ROTC), or Literacy Training Service (LTS).

MAT060:

CALCULUS WITH ANALYTIC GEOMETRY I

This is an introductory course covering the core concepts of limit, continuity, and differentiability of functions involving one or more variables. It also includes the application of differential calculations in solving problems on optimization, rates of change, related rates, tangents and normals, and approximations, as well as partial differentiation and transcendental curve tracing.

MAT070:

CALCULUS WITH ANALYTIC GEOMETRY II

This course introduces the concept of integration and its application to physical problems such as the evaluation of areas, volumes of revolution, force, and work. It covers fundamental formulas and various techniques of integration applied to both single-variable and multi-variable functions. The course also includes tracing of functions of two variables for a better appreciation of the interpretation of the double and triple integral as the volume of a three-dimensional region bounded by two or more surfaces.

Prerequisite: **MAT060**

CHM012:

CHEMISTRY FOR ENGINEERS

This course covers the basic concepts of matter and its classification; mass relationships in chemical reactions; properties of gases, liquids, and solids; fundamental principles of thermodynamics; quantum theory and electronic behavior; periodic relationship of elements in the periodic table; intramolecular forces; solutions; rate of chemical reactions; chemical and ionic equilibrium; and electrochemistry. It also includes applications of chemistry in the practice of the engineering profession such as material science, environment, energy, and safety.

CHM012.1: **CHEMISTRY FOR ENGINEERS LABORATORY**

The topics and activities of this course complement those of the lecture (CHM012).

PHY061: **PHYSICS I**

This course covers the fundamental concepts of physics including vectors, kinematics, dynamics, work, energy, and power; impulse and momentum; rotation and dynamics of rotation; elasticity; and oscillation.

It also includes the study of fluids, thermal expansion, thermal stress, heat transfer, and calorimetry, as well as waves, electrostatics, electricity, magnetism, optics, image formation by plane and curved mirrors, and image formation by thin lenses.

PHY061.1: **PHYSICS I LABORATORY**

The topics and activities of this course complement those of the lecture (PHY061).

ANS001: **INTRODUCTION TO ANIMAL SCIENCE**

This course covers the importance of animal agriculture to man, with a general introduction to animal production and research terminologies. It discusses the principles of animal breeding, physiology, and nutrition in relation to the production, processing, and marketing of animal products and by-products.

CRS001:

PRINCIPLES OF CROP PRODUCTION

This course explains the principles and practices of crop production, including the history and development of agriculture, its importance, the world food situation, and Philippine agriculture—its meaning and scope. It covers the identification and classification of crops, factors affecting crop production, basic physiological processes, sustainable crop production, and recent advances in crop production systems.

SSC001:

PRINCIPLES OF SOIL SCIENCE

This course deals with the nature, origin, and development of soils, including their physical and chemical properties and management. It also encompasses the basic concepts of plant nutrition, organic matter, and soil organisms. The course further introduces soil fertility, soil conservation and management, as well as soil survey and classification.

ENS150.2:

ENGINEERING GRAPHICS

Principles and techniques of engineering drawing using freehand and graphic software.

ENS161:

STATICS OF RIGID BODIES

Force systems; structure analyses; friction; centroids and centers of gravity; and moments of inertia.

Prerequisites: MAT070, PHY061, PHY061.1

ENS162:

DYNAMICS OF RIGID BODIES

Kinetics and kinematics of a particle; kinetics and kinematics of rigid bodies; work energy method; and impulse and momentum (linear and rotational).

Prerequisite: ENS161

ENS164:

MECHANICS OF DEFORMABLE BODIES

This course covers axial shear force and bending moments, stress-strain relationships, torsion, bending and shear stresses, beam deflection, continuous and restrained beam buckling, and the plastic behavior of structures.

Prerequisite: ENS161

ENS181:

ENGINEERING MATHEMATICS

This course deals with differentiation and integration in solving first-order, first-degree differential equations, and linear differential equations of order n . It also introduces the use of Laplace transforms in solving differential equations.

This course deals with differentiation and integration in solving first-order, first-degree differential equations, and linear differential equations of order n . It also introduces the use of Laplace transforms in solving differential equations. It is intended for all engineering students to build a firm foundation in differential equations as preparation for their degree-specific advanced mathematics courses. The coverage includes first-order differential equations, n th-order linear differential equations, and systems of first-order linear differential equations.

Students are expected to recognize different kinds of differential equations, determine the existence and uniqueness of solutions, select the appropriate methods of solution, and interpret the obtained solutions. They are also expected to relate differential equations to various practical engineering and scientific problems, as well as employ computer technology in solving and verifying solutions.

Prerequisite: MAT070

ABE011: **INTRODUCTION TO AGRICULTURAL AND BIOSYSTEMS ENGINEERING**

Introduction to the field of Agricultural and Biosystems Engineering as a profession and its role in sustainable development at both global and local levels. Topics include AB engineering projects, success stories, best practices and approaches, innovations, challenges, and opportunities.

ABE051: **THERMODYNAMICS AND HEAT TRANSFER FOR ABE**

Covers the basic laws of thermodynamics; characteristics of gases, vapor, and mixtures; and the laws governing heat transfer. Applications include insulators and heat exchangers such as condensers, cooling coils, and evaporators.

Prerequisites: MAT070, PHY061, PHY061.1

ABE052:

COMPUTER APPLICATIONS FOR ABE

Introduction to basic concepts of computer programming and computer-generated solutions applied to Agricultural and Biosystems Engineering problems.

Prerequisite: MAT070

ABE053:

SURVEYING FOR ABE

Covers surveying principles and applications, including theory and measurement of errors, distances, elevations, and directions. Topics include profile and topographic surveying, earthwork calculations, and land grading.

Prerequisite: MAT060

ABE054:

MATERIALS AND PROCESSES FOR AB ENGINEERING

Practical mensuration, proper selection and safe use of hand and power tools, and common engineering shop materials and processes. Includes basic machining, welding, and foundry practices.

Prerequisites: CHM012, CHM012.1, ENS161

ABE055:

KINEMATICS OF MACHINE ELEMENTS FOR AB ENGINEERING

Focuses on displacement, velocity, and acceleration analyses of machine elements, including cam design.

Prerequisite: ENS162

ABE056:

AB ENGINEERING ECONOMY

Covers time value of money, money discounting, and the effect of inflation. Introduces IAS and IFRS standards in financial reporting and feasibility analysis software. Topics include future value and present worth, investments, operating costs, financial and economic benefits, annual cash flow, feasibility indicators (NPV, IRR, BCR, ROI, payback period), risk/sensitivity analysis, break-even analysis, financial ratios, and preparation of international-standard feasibility studies covering market, technical, financial, socio-economic, and management aspects.

Prerequisite: MAT060

ABE057:

AB ENGINEERING DATA ANALYSIS

Introduction to the basic principles of research and research design, hypothesis testing, sampling techniques, and sample size determination. Includes Analysis of Variance (CRD, RCBD, LSD, Split-plot, Two- and Three-factorial designs), mean separation, linear regression, correlation, and the use of statistical software (e.g., SPSS).

Prerequisite: MAT070

ABE058:

COMPUTER-AIDED DESIGN (CAD) FOR ABE

Covers concepts of computer-aided drafting, introduction to CAD terminologies and environment, and application of CAD commands in engineering drawings.

Prerequisite: ENS150.2

ABE060:

GEOGRAPHIC INFORMATION SYSTEM AND SPATIAL ANALYSIS

Introduces GIS concepts, software, and hardware, and their applications in agricultural engineering. Topics include GIS database, querying methods, digitizing, thematic mapping, GIS-assisted planning, and other applications. Covers remote sensing concepts and applications, remote sensing software and hardware, GPS systems, latitude and longitude data gathering, and GPS data plotting.

Prerequisites: ABE052, ABE053

ABE130:

AB STRUCTURES ENGINEERING

Engineering principles of AB structures design; design criteria for structures construction; concepts of materials of engineering; material selection, cost estimates and specifications; application of the Phil. Building Code and other related laws, regulations and standards; preparation of 7-sheet building plan for permit application.

Prerequisites: ABE054, ENS161

ABE131:

PROPERTIES OF AB MATERIALS

Physical characteristics, electrical, mechanical, thermal and optical properties of agriculture and biosystems materials.

Prerequisites: ABE054, ABE051

ABE132:

AB PRODUCTS PROCESSING AND STORAGE

Principles and practices in the primary processing, handling, and storage of agricultural crops, including refrigeration and cold storage systems.

Prerequisites: ABE131, CRS001, ANS001

ABE133:

AB POWER AND ENERGY SOURCES ENGINEERING

Conventional and non-conventional sources of power and their measurements for agricultural and biosystems applications.

Prerequisites: ABE051

ABE134:

RENEWABLE ENERGY FOR AB APPLICATIONS

Principles and design criteria of solar energy collection; wind and micro-hydro energy resource calculations; biomass energy resource calculations.

Prerequisites: ABE133

ABE135:

FLUID MECHANICS FOR AB ENGINEERING

Properties of fluids; fluid statics, kinematics, and dynamics; flow in pressure conduits and open channels; fluid measurements; and turbomachinery.

Prerequisites: ABE051, ENS162

ABE136:

AB MACHINERY AND MECHANIZATION

Principles of agricultural and bio-production mechanization; specifications, construction, operation, testing, selection and economics.

Prerequisites: ABE133, ABE056, CRS001, SSC001

ABE137:

HYDROMETEOROLOGY

Principles and concepts of meteorological processes and phenomena, atmosphere, climatic elements, agrometeorological stations and instruments, hydrologic cycle, precipitation, infiltration, evapotranspiration, runoff, hydrologic frequency analysis, groundwater hydrology, aquifer systems, well hydraulics, and water quality analysis.

Prerequisites: ENS162, SSC001

ABE138:

IRRIGATION AND DRAINAGE ENGINEERING

Soil–plant–water relationships; flow measurement; use and selection of pumps; survey of irrigation and drainage systems; and system planning and design.

Prerequisites: ABE052, ABE137, CRS001

ABE0139:

AB ENGINEERING MANAGEMENT

This course will enable students to learn the basic function of a manager applicable in decision making which are applicable to the real world problems. Furthermore, students would learn how to apply planning, leading, organizing and control principles into the resources in order to increase efficiency.

Prerequisites: ABE56, MAT070

ABE140:

TECHNOPRENEURSHIP FOR AB ENGINEERING

This course deals with the meaning and attributes of entrepreneurship (innovativeness, risk- taking and self-reliance), the importance of entrepreneurship in ABE.

Prerequisite: ABE139

ABE141:

PROPERTIES OF AB MATERIALS

Covers basic electrical engineering concepts, farm power generation and distribution, electrical system design, fundamental components, and possible electricity sources with emphasis on non-conventional and renewable energy resources.

Prerequisites: ABE130, ENS181

ABE142:

AQUACULTURE ENGINEERING

Principles of fishery science and aquaculture, including environmental requirements and water quality parameters. Topics include design, construction, operation, and management of aquaculture facilities and equipment such as ponds, cages, aerators, handling systems, and storage.

Prerequisite: ABE137

ABE143:

FOOD PROCESS ENGINEERING

Unit operations in agricultural process engineering, including dehydration, freezing, size reduction and enlargement, evaporation for fluid concentration, mechanical separation, and mixing.

Prerequisite: ABE132

ABE144:

DESIGN AND MANAGEMENT OF AB PROCESSING SYSTEMS

Principles and practices in plant design, process and economic analysis, and agricultural plant operation and management.

Prerequisites: ABE056, ABE143, ABE139

ABE145:

AB WASTE MANAGEMENT ENGINEERING

Characterization of agricultural and bio-product wastes; processes and systems for utilization, treatment, and management. Includes economic, entrepreneurial, environmental, institutional, and legal aspects of waste utilization.

Prerequisites: GEC108, ABE056, ABE130

ABE146:

MACHINE DESIGN FOR AB PRODUCTION

Fundamentals of machine design as applied to bio-production systems.

Prerequisites: ENS164, ABE058, ABE136

ABE148:

PLANT AND LIVESTOCK SYSTEMS AND ENVT'L CONTROL ENGG.

Environmental parameters in plant and livestock production systems; microclimate modification; principles of environmental control engineering; and the design of environmentally controlled AB structures.

Prerequisites: ABE130, ABE141, ABE145

ABE195:

ABE RELATED LAWS, SPECS, CONTRACTS, AND ETHICS

Covers Agricultural and Biosystems Engineering laws, preparation of ABE contracts and specifications, engineering ethics, intellectual property rights, and other relevant laws for professional practice.

Prerequisite: GEC107

ABE147:

LAND AND WATER CONSERVATION ENGINEERING

Watershed hydrology, soil-rainfall-runoff relationships, and drainage system design. Topics include flood and erosion control structures, sloping land technologies, vegetated waterways, dams, spillways, sediment transport, and reservoir sedimentation, as well as open-channel design for soil and water conservation.

Prerequisite: ABE137

ABE197:

INDUSTRY IMMERSION PROGRAM (PRACTICUM)

This is an applied academic experience conducted under joint faculty and employer supervision during summer after the 3rd year. Involves a minimum of 320 contact hours at government or private institutions related to Agriculture, Biosystems, and Engineering. Students must have completed at least 75% of program courses to qualify.

Prerequisites: ABE060, ABE198

ABE196:

UNDERGRADUATE SEMINAR AND FIELDTRIP FOR ABE

The course introduces students to professional practice through seminars, symposiums, training, and field trips to agro-industrial and related facilities. Includes a week-long out-of-town field trip towards the end of the semester.

Prerequisite: **ABE197**

ABE198:

RESEARCH METHODS FOR ABE

Covers research methods in agricultural engineering, including statistical tools. Students prepare and defend a research proposal related to facility generation and farmer needs before a faculty panel.

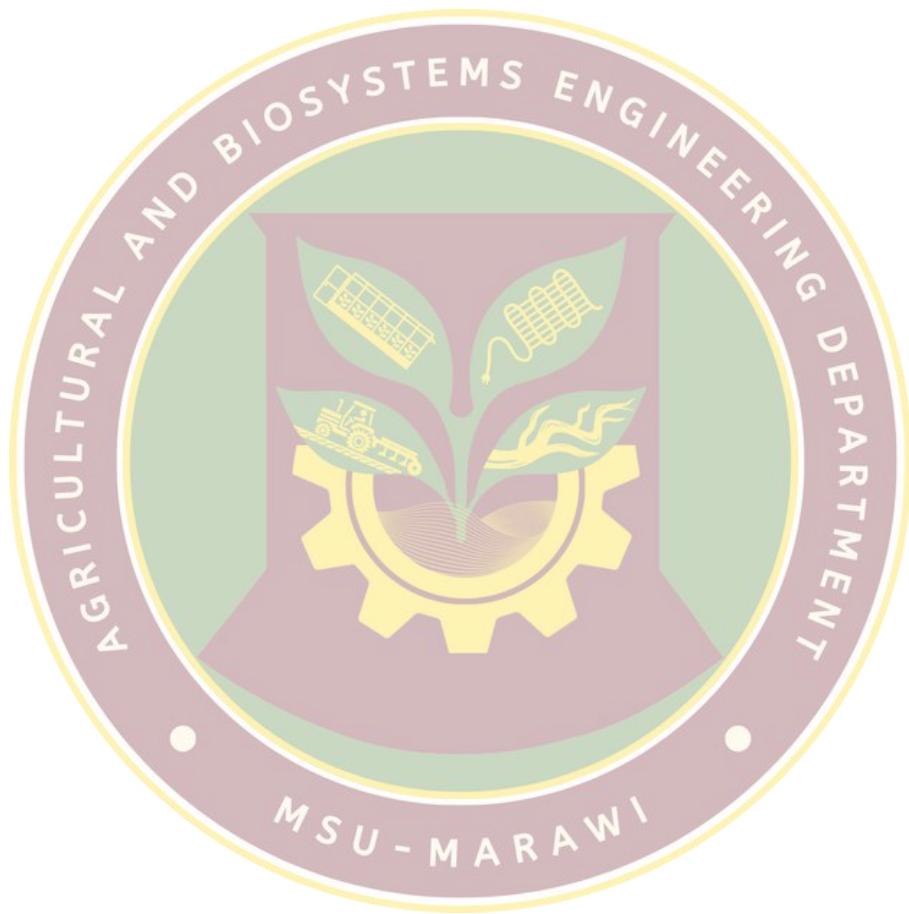
Prerequisites: **ABE057, ABE131, ABE133, ABE137**

ABE199:

UNDERGRADUATE THESIS

Final stage of student research, including data analysis, manuscript preparation, final defense, and submission of a hard-bound thesis.

Prerequisite: **ABE198**



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