Republic of the Philippines
BULACAN AGRICULTURAL STATE COLLEGE
Pinaod, San Ildefonso, Bulacan

OUTCOMES-BASED TEACHING-LEARNING SYLLABUS
ABE 150. AB Power Engineering

I. COLLEGE INFORMATION

1. College Vision
   A globally-engaged higher education institution of agriculture and allied discipline.

2. College Mission
   Provide excellent instruction, conduct relevant research and foster community engagement that produce competent graduates necessary to the development of the country

3. Institute Goals
   1. Produce professionals in the fields of study offered by the institute equipped with appropriate technologies who can meet the challenges of a dynamic environment towards global competitiveness.
   2. Implement research, extension, training and production activities in line with the institute, college, local, regional and national development thrusts.
   3. Maintain a standard of excellence in fields of endeavor the institute is engaged in.
   4. Establish linkages with different agencies and establishments (private and government) as training ground for student and faculty development and for possible funding support.

II. PROGRAM INFORMATION

1. Name of the Program : B.S. in Agricultural and Biosystems Engineering
2. CMO Reference : CMO 94 s. 2017
3. BOT Approval : BOR Resolution No. 08-595, 13 May 2008

4. Program Educational Objectives and Relationship to Institution Mission

Program Educational Objectives After 3-5 years, the graduates of the BSABE program shall:	**Mission**
a. occupy agricultural and biosystems engineering positions in public & private organizations; locally & internationally;	✓
b. occupy responsible positions in ABE education;	✓
c. continue professional development by pursuing advance degrees and relevant seminars and trainings; and	✓
d. manage agricultural and biosystems engineering-based business enterprises.	✓

III. COURSE INFORMATION

1. Course Code : ABE 150
2. Course Title : AB Power Engineering
3. Pre-requisite : ENSC 111 and MATH 141
4. Co-requisite : None
5. Type of Course : Lecture and Laboratory
6. Credit : 3 Units
7. Semester Offered : 1st Semester
8. Number of hours : 90 per semester
9. Course Description : Conventional and non-conventional sources of power and their measurements for agricultural and biosystems applications

10. Program Outcomes and Relationship to Program Objectives

	Program Outcomes (POs)	**Program Educational Objectives**			
		a	b	c	d
a	Apply knowledge of mathematics and science to solve Agricultural & Biosystems (AB) engineering problems.	✓	✓	✓	✓
b	Design and conduct experiments, as well as to analyze and interpret data.	✓	✓	✓	✓
c	Design a system, component, or process to meet desired needs within realistic constraints, in accordance with standards.	✓	✓	✓	✓
d	Function in multidisciplinary and multi-cultural teams.	✓	✓	✓	✓
e	Identify, formulate, and solve complex problems.	✓	✓	✓	✓
f	Understand professional and ethical responsibility.	✓	✓	✓	✓
g	Communicate effectively complex AB engineering activities with the engineering community and with society at large.	✓	✓	✓	✓
h	Understand the impact of AB engineering solutions in a global, economic, environmental, and societal context.	✓	✓	✓	✓
i	Recognize the need for, and engage in life-long learning.	✓	✓	✓	✓
j	Know contemporary issues.	✓	✓	✓	✓
k	Use techniques, skills, and modern engineering tools necessary for AB engineering practice.	✓	✓	✓	✓
l	Know and understand engineering and management principles as a member and leader of a team, and to manage projects in a multidisciplinary environment.	✓	✓	✓	✓
m	Understand at least one specialized field of ABE practice.	✓	✓	✓	✓

11. Course Outcomes (COs) and Relationship to Program Outcomes (POs)

Program Outcomes (PO) addressed by the course	Program Outcomes Code												
	a	b	c	d	e	f	g	h	i	j	k	l	m
	✓				✓		✓				✓		
Program Outcomes addressed by the Course Outcomes													
After completing this course, the student must be able to:	Program Outcomes Code												
	a	b	c	d	e	f	g	h	i	j	k	l	m
CO 0. Explain the relevance of the course to the fulfilling of the vision, mission, goals and objectives of the college;	**D**				**D**		**D**				**D**		
CO 1. Identify conventional and non-conventional power sources, their applications and limitations;	**D**				**D**		**D**				**D**		
CO 2. Demonstrate proper operation and performance test of small engines and farm tractors;	**D**				**D**		**D**				**D**		
CO 3. Estimate the power available from renewable energy sources.	**D**				**D**		**D**				**D**		

***Level: I – Introductory E – Enabling D - Demonstrative**

12. OBTL Course Content and Plan

Week	Course Outcomes (CO)	Topics	Unit Learning Outcomes At the end of the unit the student must be able to:	Teaching and Learning Activities		Assessment Tasks
				Teaching Activities	Learning Activities	
1	CO 0	0. Class Orientation 0.1. History of the Institute and BASC 0.2. Vision, mission, goals and objectives of the college 0.3. Course outline: class policies, course objectives, course requirements and grading system.	LO 1. Recite the vision of the college; LO 2. Recall important information in the history of the institute & the college; and LO 3. Give examples how the course can fulfill the college's VMGO.	Recorded lecture / Short videos / Learning Guide (Uploaded through the LMS)	Participation in Learning Activities through LMS	Online Quiz / Discussion Forum
	Unit 1. AB Power & Energy Sources					
1 - 2	CO 1	1. Concepts of Energy and Power 2. Sources of Power in the Farm	LO 1. Discuss the concepts of energy & power; LO 2. Describe the conventional sources of energy in the farm; and LO 3. Compare and contrast conventional and non-conventional energy sources.	Activities in Learning Guide (eg. Recorded Lecture, Short videos, Reading assignments, activities) through the LMS / Weekly deepening session	Participation in Learning Activities through LMS / Participation in Deepening Sessions and Forum	Online Quiz / Online Exam / Discussion Forum
	Unit 2. Farm Engines					
3 - 7	CO 2	3. Internal Combustion Engines 4. Classifications of ICE 5. Main Components of ICE	LO 1. Identify the parts of the engine and their functions; LO 2. Describe the principles of operation of a 2 stroke and a 4 stroke engine;	Activities in Learning Guide (eg. Recorded	Participation in Learning Activities through LMS /	Online Quiz / Online Exam / Discussion Forum / Lab

		6. Engine auxiliary system 7. Power efficiencies & measurements 8. Fuels & combustion	LO 3. Operate a single cylinder engine; LO 4. Perform routine maintenance on a single cylinder engine; and LO 5. Solve sample problems involving ICE, fuels, & combustion.	Lecture, Short videos, Reading assignments, activities) through the LMS / Weekly deepening session	Participation in Deepening Sessions and Forum / F2F Conduct of Laboratory Exercise	Reports
	Unit 3. Tractors					
8 - 11	CO 2	9. 2W Tractors 10. 4W Tractors 11. Tractor performance test 12. Tractor Operation & Maintenance	LO 1. Identify the parts and functions of tractors; LO 2. Perform tractor performance evaluation; LO 3. Be able to solve some problems involving power measurements; LO 4. Operate tractors; and LO 5. Perform routine maintenance on tractors.	Activities in Learning Guide (eg. Recorded Lecture, Short videos, Reading assignments, activities) through the LMS / Weekly deepening session	Participation in Learning Activities through LMS / Participation in Deepening Sessions and Forum / F2F Conduct of Laboratory Exercise	Online Quiz / Online Exam / Discussion Forum / Assignment / Lab Reports
	Unit 4. Renewable and Alternative Energy					
12 - 18	CO 3	13. Solar power 14. Solar Thermal applications 15. Solar PV & solar collectors 16. Wind power 17. Application of wind power in agriculture 18. Water power 19. Applications of water power in agriculture	LO 1. Discuss the principles and uses of the some renewable sources of energy and power in the farm; LO 2. Solve sample problems involving solar, wind & water power; and LO 3. Discuss the biomass conversion processes.	Activities in Learning Guide (eg. Recorded Lecture, Short videos, Reading assignments, activities) through the	Participation in Learning Activities through LMS / Participation in Deepening Sessions and Forum	Online Quiz / Online Exam / Discussion Forum / Assignment / Lab Reports

		20. Biomass Energy 21. Biomass Thermal Conversion Processes 22. Biomass Biochemical Conversion Processes		LMS / Weekly deepening session		

Note:

1. Recorded Lectures – Recorded lectures conducted through through zoom lectures.

2. Learning Guides – uploaded through the Learning Management System. This will include what lectures and materials to watch or read, assignments to accomplish and submit, forum questions to participate in, quizzes to take, and project to accomplish.

3. Deepening Sessions – will be scheduled by module to clarify unclear topics and reinforce what has been learnt.

13. Major Course Output

Course Outcomes (CO)	Required Output	Due Date
CO 1 – CO 3	Project	TBA
CO 1 - CO 2	First Examination	TBA
CO 3	Second Examination	TBA

14. Life-long Learning Opportunities

Learners of this course shall have the opportunity to develop and practice their gender responsiveness together with their 21st century skills. The Learning and Innovation skills such as: critical thinking and problem solving, communications and collaboration, creativity and innovation shall be applied in grasping the theories in identifying suitable power sources for the farm. The learners shall apply their Digital Literacy skills such as: information literacy, media literacy, Information and Communication Technologies (ICT) literacy in accessing the packages, enriching their learning, expressing themselves and presenting their outputs.

The learners shall also have the opportunity to practice their Career and Life skills such as: flexibility and adaptability, initiative and self-direction, social and cross-cultural interaction, productivity and accountability to get the most out of the flexible learning packages, pursue knowledge on their own regarding the different standards related to agricultural engines and other agricultural machinery, the provisions of the existing PAES/PNS including their future releases, and to continually strive to improve their capabilities for the advancement of the ABE profession.

15. Contribution of Course to Meeting the Professional Component

General Education:	0 %
Basic Engineering:	0 %
Professional Engineering:	100 %

16. Textbooks and References

A. Textbook
- None

B. Main References
- AMTEC. Philippine Agricultural Engineering Standards (PAES) Volumes 1-11
- CIGR (1999) CIGR Handbook of Agricultural Engineering Volume 3. ASAE, USA
- Tucit, J.D. (n.d.). Learning Guide for ABE 150. Learning Guide in Agricultural and Biosystems Power Engineering. Draft Copy for Evaluation
- Tucit, J.D. (n.d). ABE 150. Agricultural & Biosystems Power Engineering Laboratory Guide. Draft Copy for Evaluation
- Belonio, Alexis T.(2006). Agricultural Engineering Formula. CPU, Iloilo, Philippines

C. Other References
- Various agricultural engineering board exam review materials
- Internet-based references, etc.

17. Course Evaluation

Exam	+	Project	+	Assignment	+	Lab Reports	+	Quiz & Attendance	=	Total
45 %	+	15 %	+	15 %	+	15 %	+	10 %	=	100 %

COs	Assessment Tasks	Weight in Percent	Minimum Average for Satisfactory Rating	Target and Standards
CO 0	Quiz	1.0	60%	At least 75% of the students have at least 60% rating.
CO 1	Quiz	1.0	60%	At least 75% of the students have at least 60% rating.
	Exam	3.0		
	Assignment	1.0		
CO 2	Quiz	5.0	60%	At least 75% of the students have at least 60% rating.
	Exam	24.0		
	Assignment	8.0		
	Laboratory Report	15.0		
CO 3	Quiz	3.0	60%	At least 75% of the students have at least 60% rating.
	Exam	18.0		
	Assignment	6.0		
Project		15.0		
TOTAL		100.0		
Passing Percentage			60%	

The final grades will correspond to the weighted average scores shown below:

95.55 – 100.00	1.00	77.71 – 82.16	2.00	60.00 – 64.32	3.00
91.09 – 95.54	1.25	73.25 – 77.7	2.25	50.00 – 59.99	4.00
86.63 – 91.08	1.50	68.79 – 73.24	2.50	< 50.00	5.00
82.17 – 86.62	1.75	64.33 – 68.78	2.75		

18. Course Policies

- Remote Teaching and Learning (RTL) shall be utilized until such time that the ban on Face-to-Face learning is lifted. Once the ban is lifted, blended learning will be utilized. It shall be comprised of RTL for the lecture portion and Modified Face-to-Face (MF2F) scheme for the laboratory. Details of which shall be discussed in class.
- For RTL-based deliverables, the due dates shall be indicated in the packets. Deliverables not submitted on the due date shall be penalized with a 50% deduction.
- In the event that conducting of MF2F was not carried out, the students shall obtain a grade of "INC" until such time laboratory activities are conducted and graded.
- If not all the course requirements were satisfied but the class standing is still >60% a grade of Incomplete will be given until such time that all the requirements have been satisfied.
- A grade of five (5) will be given to students caught cheating in examinations and quizzes.

19. Course Materials and Facilities Made Available

- Laptop/PC, BASC authorized LMS, Open Educational Resources (OERs), Chalks, Marker, Board, Projector, Learner's Guide, Laboratory equipment, Student Handbook, Reference Materials

20. Revision History

Revision number	Date of Revision	Date of Implementation	Highlights of Revision
1	June 2016	2nd Semester 2016-2017	• Changed to OBE Format
2	January 2017	2nd Semester 2017-2018	• Changed to New OBE Format • Addition of GAD

3	June 2019	Midyear Term 2019	• Changed to OBTL Format • Incorporation of topics from the new BSABE curriculum as per CMO 94 s. 2017
4	August 2020	1st Semester 2020-2021	• Revised to conform to DE modality
5	August 2021	1st Semester 2021-2022	• Split the former Unit 2. Farm Engines and Tractors into Unit 2. Farm Engines and Unit 3. Tractors • Revised sections 12, 16, 17, 18, and 19.
6	December 2021	1st Semester 2022-2023	• Incorporated the principles of Technology enhanced flexible learning.

21. Preparation and Review

	Name	Signature	Date Signed
Prepared by	Engr. Joselito D. Tucit Associate Professor 5		
Reviewed by	Engr. Cresan Joy V. Villaroman Chairperson, ABE Program		

22. Approval

Approved by:	Engr. Alfredo L. Taluban, Jr. Dean		

IV. INSTRUCTOR/PROFESSOR INFORMATION

1. Name of Instructor/Professor : Engr. Joselito D. Tucit
2. Office and Department : BASC Intellectual Property Office
   Research, Extension, Production & Development
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5. Consultation Time : Through email or FB messenger only