



Republic of the Philippines
BATANGAS STATE UNIVERSITY
The National Engineering University

Alangilan Campus

Golden Country Homes, Alangilan, Batangas City, Philippines 4200

Tel Nos.: (+63 43) 425-0139 local 2121

E-mail Address: coe.alangilan@g.batstate-u.edu.ph | Website Address: <http://www.batstate-u.edu.ph>

College of Engineering

CURRICULUM

Bachelor of Science in Ceramics Engineering (BSCerE)

Academic Year 2023-2024

Reference CMOs: CMO No. 90 s. 2017, CMO No. 4 s. 2018 and CMO No. 20 s. 2013,
CMO No. 39, s. 2021, CMO No. 40, s. 2021

Curriculum Description

The application of Ceramic material is expanded tremendously due to the recent advances in the field of medicine which include bio-ceramics and other materials making ceramic engineering a booming field. The use of ceramic material is on the rise as it a low-cost and efficient material. Ceramics engineering is needed right from the production of ceramic teeth, bones, and other fiber optic cables used for surgery to ceramic superconductors, lasers, etc. Ceramics engineering is also used in the field of construction, electronics, military, optical fibers, sports and transportation industry. Graduates of this program are in academic, industrial, and government sectors. Job functions include research, teaching, process engineering and optimization and production of ceramic materials and related products. The program will adopt outcome-based education (OBE) framework with flipped classroom and other blended learning pedagogies.

Program Educational Objectives

The Ceramics Engineering alumni three to five years graduation shall:

- 1. Specialist.** Practiced as specialist in solving complex ceramics engineering problems leading to improvements and innovations, while taking into consideration the environmental, social, and economical requirements.
- 2. Professionalism and Leadership.** Assumed leadership position in industry, academe, government, or private sector with consideration to social and ethical responsibility.
- 3. Lifelong Learning.** Engaged in lifelong learning through further studies, research, certifications, promotions, and other personal and professional development activities.

Institutional Graduate Attributes

The student should achieve at least 75% for each IGA upon graduation.

- 1. Knowledge Competence.** Demonstrate a mastery of the fundamental knowledge and skills required for functioning effectively as a professional in the discipline, and an ability to integrate and apply them effectively to practice in the workplace.
- 2. Creativity and Innovation.** Experiment with new approaches, challenge existing knowledge boundaries and design novel solutions to solve problems.



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3. **Critical and Systems Thinking.** Identify, define, and deal with complex problems pertinent to the future professional practice or daily life through logical, analytical and critical thinking.
4. **Communication.** Communicate effectively (both orally and in writing) with a wide range of audiences, across a range of professional and personal contexts, in English and Pilipino.
5. **Lifelong Learning.** Identify own learning needs for professional or personal development; demonstrate an eagerness to take up opportunities for learning new things as well as the ability to learn effectively on their own.
6. **Leadership, teamwork, and Interpersonal Skills.** Function effectively both as a leader and as a member of a team; motivate and lead a team to work towards goal; work collaboratively with other team members; as well as connect and interact socially and effectively with diverse culture.
7. **Global Outlook.** Demonstrate an awareness and understanding of global issues and willingness to work, interact effectively and show sensitivity to cultural diversity.
8. **Social and National Responsibility.** Demonstrate an awareness of their social and national responsibility; engage in activities that contribute to the betterment of the society; and behave ethically and responsibly in social, professional and work environments.

Student Outcomes

The following skills, knowledge and behaviors are expected to be attained by the students as they progress through the program:

1. **Discipline Knowledge.** Ability to apply mathematics, sciences and principles of engineering to solve complex ceramics engineering problems;
2. **Investigation.** Ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions;
3. **Design/Development of Solutions.** Design solution, system, components, processes, exhibiting improvements/innovations, that meet specified needs with appropriate consideration for public health and safety, cultural, societal, economical, ethical, environmental and sustainability issues.
4. **Leadership and Teamwork.** Function effectively as a member of a leader on a diverse team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives;



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5. **Problem Analysis.** Identify, formulate, and solve complex ceramics engineering problems by applying principles of engineering, science, and mathematics;
6. **Ethics and Professionalism.** Apply ethical principles and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, environmental, and societal contexts;
7. **Communication.** Communicate effectively on complex engineering activities with the community, and the society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions;
8. **Environment and Sustainability.** Recognize the impact of professional engineering solutions in societal, global, and environmental contexts and demonstrate knowledge of and need for sustainable development;
9. **Lifelong Learning.** Recognize the need for, and ability to engage in independent and life-long learning in the broadest context of technological change;
10. **The Engineer and Society.** Apply reasoning based on contextual knowledge to assess societal, health, safety, legal, cultural, contemporary issues, and the consequent responsibilities relevant to professional engineering practices;
11. **Modern Tool Usage.** Apply appropriate techniques, skills, and modern engineering and IT tools to complex ceramics engineering activities;
12. **Project Management and Finance.** Demonstrate knowledge and understanding of engineering management and financial principles as member or a leader of a team to manage projects in multidisciplinary settings, and identify opportunities of entrepreneurship; and
13. **Social and National Responsibility.** Apply acquired ceramics engineering knowledge and skills in addressing community problems that contributes to national development.



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CURRICULUM COMPONENTS

Classification/Field/Course	Credit Units	Number of Hours/Week	
		Lec	Lab
TECHNICAL COURSES			
A. Mathematics			
Differential Calculus	3	3	0
Integral Calculus	3	3	0
Engineering Data Analysis	3	3	0
Differential Equations	3	3	0
Sub Total	12	12	0
B. Natural/Physical Sciences			
General Chemistry	4	3	3
Physics 1	4	3	3
Modern Biology	3	2	3
Sub Total	11	8	9
C. Basic Engineering Sciences			
Introduction to Engineering	1	0	3
Engineering Drawing	1	0	3
Engineering Economics	3	3	0
Technopreneurship	3	3	0
Engineering Management	3	3	0
Statics of Rigid Bodies	3	3	0
Dynamics Of Rigid Bodies	2	2	0
Mechanics of Deformable Bodies	3	3	0
Research Methods	3	3	0
Computer Programming 1	1	0	3
Sub Total	23	20	9
D. Allied Courses			
Basic Electrical Engineering	3	3	0
Environmental Science and Engineering	3	3	0
Analytical Chemistry	5	4	3
Principles of Geology	3	3	0
Fluid Mechanics	2	2	0
Sub Total	16	15	3
E. Professional Courses			
Computer Applications in Ceramics Engineering	2	0	6
Ceramics Engineering as a Profession	1	1	0
Ceramics Raw Materials and Processes	4	3	3
Crystal Chemistry	3	3	0
Thermodynamics of Materials	3	3	0
Phase Equilibria in Ceramics Engineering	3	3	0
Kinetics of Materials and Processes	3	3	0
Elements of Mineralogy	3	3	0
Rheometry and Rheology	1	1	0
Ceramics Measurement	2	0	6
Thermomechanical Properties	2	1	3
Microscopy and X-ray Characterization	2	2	0
Spectroscopy	2	2	0
Refractories and Kiln Design	2	1	3
Glazes and Enamels	3	2	3
Cement Manufacturing Technology	2	2	0
Properties of Ceramics	2	1	3



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Glass Manufacturing Technology	2	2	0
Production of Ceramic Wares	5	3	6
Design and Analysis of Experiments in CerE	3	3	0
Laws, Seminars and Plant Visits	3	2	3
Ceramic Engineering Design 1	2	1	3
Ceramic Engineering Design 2	2	1	3
Quality Assurance	1	1	0
Advanced Ceramics	2	2	0
Ceramics Engineering Project 1	2	1	3
Ceramics Engineering Project 2	2	0	6
On-the-Job Training	4	320 hours	
Fundamentals of Material Science and Engineering	3	3	0
Ceramics Process Industries	3	3	0
Integrative Studies	2	0	6
Sub Total	76	53	57
F. Elective Courses			
CerE Elective 1	3	3	0
CerE Elective 2	3	3	0
Sub Total	6	6	0
NON-TECHNICAL COURSES			
A. General Education Courses			
Understanding the Self	3	3	0
Mathematics in the Modern World	3	3	0
The Contemporary World	3	3	0
Readings in Philippine History	3	3	0
Purposive Communication	3	3	0
Ethics	3	3	0
Art Appreciation	3	3	0
Science, Technology and Society	3	3	0
Kontekstwalisadong Komunikasyon sa Filipino	3	3	0
People and the Earth's Ecosystem	3	3	0
Sub Total	30	30	0
B. Mandated Courses			
Life and Works of Rizal	3	3	0
ASEAN Literature	3	3	0
Sub Total	6	6	0
C. Physical Activities Toward Health and Fitness			
PATHFit 1 - Movement Competency Training	2	2	0
PATHFit 2 - Exercise-based Fitness Activities	2	2	0
PATHFit 3 - Menu of Dance, Sports, Martial Arts, Group Exercise, Outdoor & Adventure Activities Menu Offering: Traditional and Recreational Games	2	2	0
PATHFit 4 - Menu of Dance, Sports, Martial Arts, Group Exercise, Outdoor & Adventure Activities Menu Offering: Team Sports (Basketball and Volleyball)	2	2	0
Sub Total	8	8	0
D. National Service Training Program			
National Service Training Program 1	3	3	0
National Service Training Program 2	3	3	0
Sub Total	6	6	0
Grand Total	194	164	78



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PROGRAM OF STUDY

FIRST YEAR						
FIRST SEMESTER						
Course Code	Course Title	Units	No. Hour/s		Pre-requisite(s)	Co-requisite(s)
			Lec	Lab		
GEEd 101	Understanding the Self	3	3	0		
GEEd 102	Mathematics in the Modern World	3	3	0		
GEEd 105	Readings in Philippine History	3	3	0		
GEEd 106	Purposive Communication	3	3	0		
SCI 401	General Chemistry	4	3	3		
MATH 401	Differential Calculus	3	3	0		
ENGG 401	Introduction to Engineering	1	0	3		
PATHFit 1	Movement Competency Training	2	2	0		
NSTP 111	National Service Training Program 1	3	3	0		
Total		25	23	6		

FIRST YEAR						
SECOND SEMESTER						
Course Code	Course Title	Units	No. Hour/s		Pre-requisite(s)	Co-requisite(s)
			Lec	Lab		
GEEd 104	The Contemporary World	3	3	0		
GEEd 108	Art Appreciation	3	3	0		
GEEd 109	Science, Technology and Society	3	3	0		
CpE 401	Computer Programming 1	1	0	3		
MATH 402	Integral Calculus	3	3	0	MATH 401	
ENGG 402	Engineering Drawing	1	0	3		
SCI 403	Physics 1	4	3	3	MATH 401	MATH 402
PATHFit 2	Exercise-based Fitness Activities	2	2	0	PATHFit 1	
NSTP 121	National Service Training Program 2	3	3	0	NSTP 111	
Total		23	20	9		

FIRST YEAR						
MIDTERM SEMESTER						
Course Code	Course Title	Units	No. Hour/s		Pre-requisite(s)	Co-requisite(s)
			Lec	Lab		
GEEd 103	Life and Works of Rizal	3	3	0		
GEEd 107	Ethics	3	3	0		
SCI 402	Modern Biology	3	2	3		
Total		9	8	3		



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SECOND YEAR						
FIRST SEMESTER						
Course Code	Course Title	Units	No. Hour/s		Pre-requisite(s)	Co-requisite(s)
			Lec	Lab		
ChE 401	Analytical Chemistry	5	4	3	SCI 401	
CerE 401	Crystal Chemistry	3	3	0	SCI 401	
ENGG 407	Statistics of Rigid Bodies	3	3	0	SCI 403, MATH 402	
MATH 404	Differential Equations	3	3	0	MATH 402	
MATH 403	Engineering Data Analysis	3	3	0	MATH 402	
CerE 402	Ceramics Engineering as a Profession	1	1	0		
CerE 404	Ceramics Measurements	2	0	6		
Fili 101	Kontekstwalisadong Komunikasyon sa Filipino	3	3	0		
PATHFit 3	Menu of Dance, Sports, Martial Arts, Group Exercise, Outdoor & Adventure Activities Menu Offering: Traditional and Recreational Games	2	2	0	PATHFit 1 and 2	
Total		25	22	9		

SECOND YEAR						
SECOND SEMESTER						
Course Code	Course Title	Units	No. Hour/s		Pre-requisite(s)	Co-requisite(s)
			Lec	Lab		
SCI 405	Principles of Geology	3	3	0		
CerE 405	Thermodynamics of Materials	3	3	0	SCI 401	
ENGG 418	Mechanics of Deformable Bodies	3	3	0	ENGG 407	
ENGG 408	Dynamics of Rigid Bodies	2	2	0	ENGG 407	
CerE 403	Fundamentals of Material Science and Engineering	3	3	0	SCI 401, SCI 403	
CerE 407	Computer Applications in Ceramics Engineering	2	0	6	CerE 402	
ENGG 404	Engineering Economics	3	3	0	2nd year standing	
ENGG 413	Environmental Science and Engineering	3	3	0	SCI 401	
PATHFit 4	Menu of Dance, Sports, Martial Arts, Group Exercise, Outdoor & Adventure Activities Menu Offering: Team Sports (Basketball and Volleyball)	2	2	0	PATHFit 1 and 2	
Total		24	22	6		



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THIRD YEAR						
FIRST SEMESTER						
Course Code	Course Title	Units	No. Hour/s		Pre-requisite(s)	Co-requisite(s)
			Lec	Lab		
CerE 408	Kinetics of Materials and Processes	3	3	0	SCI 401	
CerE 409	Phase Equilibria in Ceramics Engineering	3	3	0	CerE 405	
CerE 410	Thermomechanical Properties	2	1	3	CerE 403	
CerE 411	Spectroscopy	2	2	0	SCI 401	
CerE 412	Design and Analysis of Experiment in CerE	3	3	0	MATH 403	
ME 406	Fluid Mechanics	2	2	0	ENG 408	
CerE 406	Ceramics Raw Materials and Processes	4	3	3	ChE 401, CerE 403	
CerE 414	Elements of Mineralogy	3	3	0	SCI 405	
EE 419	Basic Electrical Engineering	3	3	0	SCI 403	
Total		25	23	6		

THIRD YEAR						
SECOND SEMESTER						
Course Code	Course Title	Units	No. Hour/s		Pre-requisite(s)	Co-requisite(s)
			Lec	Lab		
CerE 415	Production of Ceramic Wares	5	3	6	CerE 406	
CerE 416	Rheometry and Rheology	1	1	0	ENG 408	
CerE 417	Properties of Ceramics	2	1	3	SCI 403	
CerE 418	Cement Manufacturing Technology	2	2	0	CerE 406	
CerE 419	Glazes and Enamels	3	2	3	CerE 409, CerE 410	
CerE 420	Microscopy and X-ray Characterization	2	2	0	CerE 414	
ENG 405	Technopreneurship	3	3	0	3rd year standing	
ENG 416	Research Methods	3	3	0	Math 403	
Total		21	17	12		

THIRD YEAR						
MIDTERM SEMESTER						
Course Code	Course Title	Units	No. Hour/s		Pre-requisite(s)	Co-requisite(s)
			Lec	Lab		
CerE 413	Refractories and Kiln Design	2	1	3	CerE 406	
ENG 406	Engineering Management	3	3	0	3rd year standing	
Litr 102	ASEAN Literature	3	3	0		
Total		8	7	3		



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FOURTH YEAR						
FIRST SEMESTER						
Course Code	Course Title	Units	No. Hour/s		Pre-requisite(s)	Co-requisite(s)
			Lec	Lab		
GEEd 110	People and the Earth's Ecosystems	3	3	0		
CerE 421	Ceramics Process Industries	3	3	0	CerE 417	
CerE 422	Laws, Seminars and Plant Visits	3	2	3	4th year standing	
CerE 423	Ceramics Engineering Design 1	2	1	3	4th year standing	
CerE 424	Glass Manufacturing Technology	2	2	0	CerE 406	
CerE 431	CerE Elective 1	3	3	0		
CerE 432	CerE Elective 2	3	3	0		
CerE 425	Advanced Ceramics	2	2	0	CerE 401, CerE 406	
CerE 426	Quality Assurance	1	1	0	MATH 403, CerE 404	
CerE 427	Ceramics Engineering Project 1	2	1	3	CerE 412	
Total		24	21	9		

FOURTH YEAR						
SECOND SEMESTER						
Course Code	Course Title	Units	No. Hour/s		Pre-requisite(s)	Co-requisite(s)
			Lec	Lab		
ENGG 417	On-the-Job Training	4	320 hours		4th year standing	
CerE 428	Ceramic Engineering Project 2	2	0	6	CerE 427	
CerE 429	Ceramic Engineering Design 2	2	1	3	CerE 423	
CerE 430	Integrative Studies	2	0	6	Graduating standing	
Total		10	1	15		
TOTAL CREDIT UNITS		194	164	78		