



Republic of the Philippines
BATANGAS STATE UNIVERSITY
BatStateU Alangilan
Alangilan, Batangas City



College of Engineering, Architecture and Fine Arts
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CURRICULUM

Master of Science in Material Science and Engineering (MSMSE)

Academic Year 2021-2022

Reference CMOs: 15 Series of 2019: Policies, Standards and Guidelines for Graduate Programs

Curriculum Description

The Master of Science in Materials Science and Engineering (MSMSE) program deals with the study of physical and engineering properties and the processing of metals, polymers, composites and other hybrid and advanced materials. The program covers both theoretical and technical principles of materials characterization and testing, property enhancement and modification, and materials design and engineering. Graduates of this program are in academic, industrial, and government sectors. Job opportunities include patent examiner, project manager, quality assurance manager, manufacturing systems engineer, materials engineer, high education lecture, process engineer, research and development engineer and laboratory specialist. The program includes 9 credits of core courses, 9 credits of major courses, 6 credits of elective courses, and 6 credits of theses. The program will adopt outcome-based education (OBE) framework with flipped classroom and other blended learning pedagogies.

Program Educational Objectives of Material Science and Engineering (PEO)

The MS Material Science and Engineering alumni three to five years after graduation shall:

1. **Specialist.** Practiced as a high-level in solving complex material science and 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 (IGA)

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.
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.

Students Outcomes

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

1. **Knowledge Competence.** Demonstrate a comprehensive and broad understanding of material science and engineering principles and apply advanced knowledge in the specific engineering discipline;
2. **Critical and System Thinking.** Analyze, synthesize, create and evaluate the challenges in material science and engineering practice;
3. **Design and Analysis.** Design components, devices, and systems to meet specified engineering needs under real-world constraints;
4. **Communication.** Communicate effectively the technical knowledge, both orally and in writing, on complex material science and engineering activities;
5. **Leadership and Teamwork.** Function effectively as an individual, a team member, or as a leader in diverse work environments;
6. **Creativity and Innovation.** Contribute to the generation, dissemination and preservation of knowledge, methodologies, techniques, and processes;
7. **Lifelong Learning.** Engage in continuous professional development and lifelong learning endeavors;
8. **Ethics and Professionalism.** Conduct oneself within professional and ethical standards; and
9. **Research.** Perform independent scientific research that results in innovation with application.

CURRICULUM COMPONENTS

A. CORE COURSES (9 units)		
Course Code	Course Title	Credit Unit
ENGG 501	Computational Mathematics 1	3
ENGG 502	Computational Mathematics 2	3
ENGG 503	Design of Experiments and Data Analytics	3
B. SPECIALIZATION COURSES (9 units)		
Course Code	Course Title	Credit Unit
MSMSE 501	Fundamentals of Materials Science and Engineering	3
MSMSE 502	Thermodynamics of Materials	3
MSMSE 503	Crystallography and Diffraction	3
C. THESIS COURSES (6 units)		
Course Code	Course Title	Credit Unit
MSMSE 512	Thesis 1	3
MSMSE 513	Thesis 2	3
D. ELECTIVE COURSES (6 units)		
Course Code	Course Title	Credit Unit
MSMSEE 501	Material Failure Analysis	3
MSMSEE 502	Computational Nanotechnology	3
MSMSEE 503	Smart Materials	3
MSMSEE 504	Biomechanics and Biomaterials	3
MSMSEE 505	Materials and Process Design	3
MSMSEE 506	Energy Materials	3
MSMSEE 507	Introduction to Plasma Science and Processing Technology	3
MSMSEE 508	Introduction to Surface Science and Spectroscopy	3
MSMSEE 509	Content, Pedagogy, and Assessment in Engineering Education	3
MSMSEE 510	Leadership, Policy and Change in STEM Education	3
MSMSEE 511	Independent Study	3