Tuskegee University
College of Engineering
M.S. in Mechanical Engineering

Name of Degrees Offered		College	Department
Master of Science in Mechanical Engineering		Engineering	Mechanical Engineering
Regular Thesis Program X☐	Non-Thesis ☐	Non-Degree☐ Certificate☐ Other☐	
Dr. Ray Pardosh, Head	334-727-8920	pkray@mytu.tuskegee.edu	
Mrs. Walker, Coordinator	334-727-8918	jwalker@mytu.tuskegee.edu	

The mission of the Department in this area is to provide the undergraduate students with a broad education in the professional discipline as well as in the liberal arts area. For the graduate students, the mission is to provide them with advanced technical knowledge and research capabilities in specialized area. The Department strives to instill a desire for lifelong learning in all students.

Admission Requirements:
Applicants must have completed the B.S/MS degree in either of the following areas to be considered for the Master's or Ph.D. program in MSE:

- Chemistry
- Engineering
- Mathematics
- Physics

Applicants must also have a cumulative GPA of 3.5 or better. The minimum acceptable combined GRE score is 1000 (old) or 300 (new).

Core Courses (12 credits): Required for All Students in the Master's program
Master's Program in Mechanical Engineering
24 credits of Core and Elective Courses and 6 credits of Research

Elective Courses (12 credits): Determined by Student's Major Professor
Elective courses may be any graduate. level courses offered at Tuskegee University or elsewhere. Approval of the Major Professor is necessary for a student to sign up for electives.

Transfer Credits
The student's Advisory Committee may recommend transfer credits for up to 9 hours for graduate courses taken by the student at Tuskegee University as part of another graduate program or at any other institution. Transfer credits may be recommended under both core and elective categories.

Advisory Committee
During the first semester of his/her study in the Master of Science program, the student and his/her Major Professor must recommend to the Head of the Department for approval, the student's Advisory Committee consisting of a minimum of four members including the Major Professor and the Head of the Department. The Advisory Committee shall also serve as the Examination Committee.

Admission to Candidacy
Immediately after completing 9 credits of course work at Tuskegee University, the student must submit, to the Dean of Graduate Studies, a completed application for the Candidacy for the degree.

Seminars
A student pursuing the Master of Science degree in Materials Science and Engineering must present at least two seminars. The first seminar shall be the presentation of the student's research proposal of the Master's thesis. The second or the final seminar shall be his/her Final Oral Examination for the degree. The student is also required to participate in all seminars arranged by the department.

Research assistantships and fellowships are available for students admitted to the program. Continuation of the financial support depends on student's performance in course work and research and availability of funds.

Master's Program in Mechanical Engineering **24 credits of Core and Elective Courses and 6 credits of Research** *(elective courses depend on student's research topic)*		
Course	**Content**	**Innovation**
MATH 0561. APPLIED MATHEMATICS I. CR. 3. (core course)	Functions of a complex variable with applications to Physics and Engineering; calculus of variations; matrices and systems of linear equations; eigenvalues and eigenvectors; diagonalization. Prerequisite: Minimum grade of "C" in MATH 0461 or Departmental Approval.	It's the first graduate level mathematics course, which this graduate program considers to be a core course.
MATH 0562. APPLIED MATHEMATICS II. CR. 3. (core course)	Special functions; partial differential equations; characteristics; solutions of Laplace, Helmholtz, wave and heat equations; boundary conditions and eigenfunctions; Sturm-Liouville problems; Green's function. Prerequisite: Minimum grade of "C" in MATH 0461 or Departmental Approval.	It's the second graduate level mathematics course, which this graduate program considers to be a core course.
MSEG 0605: RESEARCH ETHICS. CR. 1. (core course)	This course will provide students an understanding of ethical issues in scientific research. Moral complexities in the engineering profession will be highlighted. Case studies will be used to illustrate how to analyze and resolve identified ethical issues.	Several case studies of misconduct in research are discussed in this course.
MSEG 0606: LITERATURE SEARCH AND TECHNICAL WRITING. Cr. 2. (core course)	To prepare students for writing professional papers, making presentations, and preparing theses/dissertations. To accomplish this objective, the literature related to material science and engineering is surveyed. The tools for searching the material science and engineering literature are explored. The instructors will critically analyze abstracts, formal papers and theses/dissertations related writings prepared by the students.	In this course various ways of searching the literature are discussed. Students are guided in writing their research proposal for their Master's degree.
MENG 0512. ADVANCED FLUID MECHANICS. CR. 3. (elective)	Development of rate of strain relationships for viscous compressible and incompressible fluid flow. General equations of motion, laminar and turbulent flow, boundary layer theory. Prerequisite: MENG 0313.	This is a first course in fluid mechanics for students interested in specializing in thermal-fluids area.
MENG 0527: FRACTURE MECHANICS. CR. 3. (elective)	Basic principles and applications of fracture mechanics by integrating aspects of materials science and solid mechanics. Emphasis is focused on linear elastic and nonlinear elastic-plastic fracture mechanics theories; practical knowledge of fracture toughness evaluation of metals, polymer and ceramic composites; fatigue crack propagation. Prerequisite: MENG 0416.	This course deals with fracture mechanisms and crack propagation in solids. This course should be taken by students specializing in solid mechanics/materials area.
MENG 0541: COMPOSITE MATERIALS. CR. 3. (elective)	Introduction to composite materials; fibers, matrix and interface; mechanical and chemical aspects; design, chemical synthesis, manufacturing and processing methods; mechanical testing methods; understanding of failure mechanisms based on static, fatigue, impact and other properties; microstructural considerations; nondestructive evaluation (NDE) including ultrasonic, acoustic and vibration techniques. Prerequisite: MENG 0318.	This is a first graduate level course in composite materials for students interested in specializing in solid mechanics/materials area.
MENG 0550: ADVANCED THERMODYNAMICS. CR. 3. (elective)	A statistical approach to the study of the first and second laws, thermodynamics relations for the pure substance, application to Clausius inequality and availability in steady flow, real gas mixtures, introduction to the third law and chemical equilibrium. Prerequisite: MENG 0414.	This is a first course in engineering thermodynamics at the graduate level for students interested in specializing in thermal-fluids area.
MENG 0551: ADVANCED HEAT TRANSFER. CR. 3. (elective)	General problems of heat transfer by conduction, convection and radiation; solution by the analog and numerical methods, thermodynamic boundary layers, analysis of heat exchanges; problems on thermal radiation; extraterrestrial radiation. Prerequisite: MENG 0414.	This is a first course in heat transfer at the graduate level for students interested in specializing in thermal-fluids area.

MENG 0628: FINITE ELEMENT METHOD. CR. 3. (elective)	Principles of Finite Element Analysis. Variational Principles, Displacement Polynomials and Shape Functions, Element Family, Application to 2D and 3 D Continuum Problems. Application to Thermal and Fluid Flow Problems, Computer Program Development. Prerequisites: Graduate Standing and Instructor's Approval.	It is a graduate level course that allows students solve for deformation and stresses in solid bodies as well as solve heat transfer and fluid flow problems.
MSEG 0516: Advanced Strength of Materials. CR. 3. (core course)	A continuation of the undergraduate course in Strength of Materials (MENG 0316). Emphasis is placed on stress-strain relationships, failure behavior, yield and fracture under combined stresses, fracture toughness of cracked members, fatigue crack growth, creep and damping; and on determination of static and dynamic mechanical properties through laboratory experiments. Prerequisite: MENG 0316	This is a first graduate level course in strength of materials for students interested in specializing in solid mechanics/materials area.
MSEG 0518: MATERIALS SCIENCE AND ENGINEERING. CR. 3. (core course)	A continuation of the undergraduate course in Materials Science and Engineering (MENG 0318). Emphasis is placed on the properties and processing methods of classical and modern materials. Application, degradation, selection, design consideration, economic, environmental and societal issues of these materials. Use of microscope to verify materials microstructure and defects through laboratory experiments. Prerequisite: MENG 0318	This is a first graduate level course in materials for students interested in specializing in solid mechanics/materials area.
MSEG 0521: POLYMER SCIENCE AND ENGINEERING. CR. 3. (core course)	Introduce the concepts of polymer science and engineering; chain structure and configuration; molecular weights and sizes, concentrated solutions and phase separation behavior; the amorphous state; viscoelasticity and rubber elasticity; transitions and relaxations; crystalline state of polymers; morphology of crystalline polymers.	This is a first graduate level course in polymer science and engineering for students interested in specializing in solid mechanics/materials area.
MSEG 0625: THERMODYNAMICS OF MATERIALS SYSTEMS. CR. 3. (elective)	MSEG 0625: THERMODYNAMICS OF MATERIALS SYSTEMS. CR. 3. The laws of thermodynamics applied to the stability of material phases, crystal imperfections, solubility, oxidation, surface and interface energy, and transformation. Application of the laws of Thermodynamics to Material Systems: chemical reactions, phase equilibria and transformations, oxidation, theoretical phase diagram generation and non-ideal solution theory.	This course is essential for students who study the thermal aspects of advanced materials.
MSEG 0629: MICROSTRUCTURAL ANALYSIS OF MATERIALS. CR. 3. (elective)	To provide an integrated treatment of the science of microstructural analysis which emphasizes the interaction of the specimen with the electron beam used to probe the microstructure. The three main aspects of microstructural morphology, phase identification, crystallography, and microanalysis of the chemical composition will be covered. Following an introduction, the principal methods of characterization, e.g., diffraction analysis, scanning and transmission electron microscopy, and chemical microanalytical techniques will be taught. Some laboratory assignments will also be incorporated in this course. (*Prerequisite: MSEG 0604).*	This course is essential for students who study the materials' structure using various techniques and apply to understand structure-property relationships
MENG 0700 Thesis. CR. 6. (Required)	This course spans over two semesters. Student conducts research on a topic jointly selected by the student and his/her major professor. The student interacts with the major professor on a regular basis as he/she move forward with his/her research planning and findings. At the conclusion of the proposed research the student submits a written thesis to the advisory committee headed by the major professor and the deans of his/her academic program and the dean of Research and Graduate Studies. The	There is a great deal of innovation involved in selecting the research topic, planning the research and preparing the thesis and publications for the open literature.

	student is also required to make an oral presentation to the Advisory committee to receive the Master's degree.	

List key **Graduate Faculty*** supporting the degree in the College		
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