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

Name of Degrees Offered		College	Department
Master of Science in Chemical Engineering		Engineering	Chemical Engineering
Regular Thesis Program ☒	Non-Thesis ☐	Non-Degree ☐ Certificate ☐ Other ☐	
Dr. Nader Vahdat, Head Mrs. Daveyon Johnson, Coordinator	334-727-8978 334-727-8089	vahdatn@mytu.tuskegee.edu johnsondm@mytu.tuskegee.edu	

The Master of Science Program in Chemical Engineering (MSE) is a program housed in the Chemical Engineering Department of College a(c6c) H‰”UËŽÛH ¼û+x”,XÑÛÒÜ completed the verbal and quantitative parts of the Graduate %²â° Record Examination (GRE).

After the student is granted admission, he/she meets with the chair of the Chemical Engineering department for initial guidance. During the first semester of study, the student must form his/her Advisory Committee, which will consist of the major professor/advisor, and a minimum of two other faculty members.

The student must complete the following requirements to receive the Master degree in chemical engineering:

The proposed M. S. degree program in chemical engineering should be very similar to the Master's degree programs in Electrical and Mechanical Engineering in the CEPS. Therefore, it is recommended that all students in the M.S. degree program in chemical engineering must:

- Complete a minimum of twenty four (24) credits of course, including twelve (12) credits of core courses, with a minimum grade point average of 3.0.
- Complete six credits of research and formally present the results of the research to the Advisory Committee, appointed by the Dean of Graduate Studies and Research, in the form of a thesis. All students pursuing the M.S. degree in chemical engineering are required to take the following core courses:

Core Courses (12 credits): Required for All Students in the Master's program

1. Math 561: Advanced Mathematics I (3 credits)
2. Math 562: Advanced mathematics II (3 credits)
3. CENG 550 / MSEG 625: Advanced Thermodynamics (3 credits)
4. CENG 565: Advanced Chemical Reaction Engineering (3 credits)

Elective Courses (12 credits): Determined by Student's Major Professor

The students will complete the remaining twelve (12) credits of course work (referred as electives) by taking graduate courses from the list given in section 7.

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 another 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 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.

List Core Courses with University Catalog number and brief Description

CENG 510	Chemical Engineering Analysis, Lect. 3, Lab 0, Cr. 3. Prerequisite: Graduate Standing, Mathematical analysis of Chemical Engineering problems to include the formulation of differential equations, analytical and numerical techniques for problem solution, data correlation and analysis, computer applications.
CENG 520	Advanced Heat Transfer. Lect. 3, Lab 0, Cr. 3, Prerequisite CENG 310. Analysis and design principles for advanced heat transfer processes with special emphasis on two-phase heat transfer in reaction systems, packed beds, and other process equipment.
CENG 530	Advanced Process Dynamics and Control Lect. 3, Lab 0, Cr. 3. Prerequisite CENG 430. Introduction to Modern Control Theory: Advanced linear control systems analysis and introduction to nonlinear systems. Topics includes design of nonlinear and robust controllers for various classes of nonlinear systems; model predictive control of linear and nonlinear systems, advanced methods for tuning of classical controllers, and introduction to control of distributed parameter systems.
CENG 540	Advanced Chemical Engineering Transport Phenomena Lect 3, Lab 0, Cr. 3. Prerequisite CENG 410. Application of principles of momentum, energy, and mass transport to advanced problems in laminar and turbulent systems, including systems, with chemical reaction and interfacial phenomena.

CENG 550	Advanced Chemical Engineering Thermodynamics. Lect. 3, Lab 0, Cr. 3. Prerequisite CENG 350, Application of the laws of thermodynamics to phase and chemical reaction equilibrium. Introduction to statistical thermodynamics, molecular simulations, and the evaluation of thermodynamic properties from molecular simulations.
CENG 565	Advanced Chemical Reaction Engineering. Lect. 3, Lab 0, Cr. 3, Prerequisite CENG 360. Emphasizes kinetics and mechanisms of heterogeneous reactions in different types of reactors. Specific topics include gas-solid noncatalytic reactions; catalytic surfaces and catalyst characterization; adsorption, diffusion, reaction, and heat transfer in porous catalysts.
CENG 570	Advanced Water and Wastewater Treatment. Lect. 3, Lab. 0, Cr. 3. Prerequisite: Graduate Standing. Physico-chemical hydrodynamics in water and wastewater treatment, Colloidal dispersions and electro-kinetic transport phenomena, Zeta potential, DLVO theory and particulate surface potential, water and wastewater filtration, Coagulation, flocculation, and disinfection, advanced oxidation methods, biological treatment systems.
CENG 575	Environmental Solids Separation and Processing Methods. Lect. 3, Lab 0, Cr. 3. Prerequisite: Graduate Standing. Application of physical proc

	turbulent flow, boundary layer theory. Numerical methods in fluid mechanics.
MENG 634	Numerical Analysis in Engineering. Lect. 3, Lab. 0, Cr. 3. Theoretical and computational aspects of polynomial and spline approximations; numerical differentiation and integration; numerical solution of algebraic equations and of systems of linear equations; Solutions of ordinary differential equations (initial value problems); analysis of iterative methods for non-linear, finite dimensional equations; Newton's method, gradient related methods, update methods, etc., finite difference approximations for elliptic and parabolic boundary value problems. The general thrust of this course is the application of these numerical methods in the design of engineering systems.
EVSC 501	BIO-STATISTICS II. Lect. 2, Lab 3, 3 credits. The application of advanced statistical methods in analyzing biological data to include analysis of two-way experiments, factorial experiments, covariance analysis, least-square analysis with unequal subclass numbers and curvilinear regression. Laboratory assignments require the use of the University's time share computer and departmental microcomputers. Prerequisite: EVSC 500 or Permission of instructor.

MSEG 0601	PHYSICS OF MATERIALS, 3cr. To gain an understanding of the nature of materials based on the physical principles on which the properties of materials depend. The basic relationships introduced in undergraduate physics and chemistry courses are extended using the concepts of quantum mechanics to relate the properties of materials to their internal structure and external environment. Optical, electrical, thermal and magnetic properties of metals, semiconductors and insulators will be covered.
MSEG 0603	POLYMER PHYSICS. Cr. 3. Principles of polymer physics will be taught. Emphasis is placed on classification of polymers, molecular sizes, polymer blends, morphology, time-independent elasticity, linear viscoelasticity and yield, and yield and fracture of polymers.
MSEG 0604	MATERIALS PROPERTIES AND CHARACTERIZATION, 3cr, multidisciplinary course offering a practical hands-on experience with various analytical equipment and analysis of advanced composite materials including nanomaterials. Focus on sample preparation, principles and applications of various microscopy, thermal and mechanical methods. Covered topics include AFM, SEM, TEM, EDX, X-ray, TGA, DSC, DMA, TMA, tensile, compression and flexure tests.
MSEG 0605	RESEARCH ETHICS. Cr. 1. The course will provide students with 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.
MSEG 0606	LITERATURE SEARCH AND TECHNICAL WRITING . Cr. 2. To prepare the MSEG Ph.D. and MS candidates for writing professional papers, making presentations, and preparing theses. 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 critically analyze abstracts, formal papers and thesis-related writings prepared by the students.
MSEG 0612	NANOSCALE SCIENCE AND ENGINEERING. Cr. 3. This course aims to introduce students to nanoscale materials science and technology. It will cover topics such as nanoscale material synthesis, properties and applications. It will also emphasize the theory, modeling and simulation approaches used to understand the synthesis mechanisms and morphological changes in nanoscale materials systems, as well as the properties of materials at the nanoscale. The course will have a balanced materials science (main thrust of the course) mechanics, physics and chemistry and technology flavor. Prerequisites: graduate standing or senior undergraduate
MSEG 0621	POLYMER SCIENCE AND ENGINEERING. Cr. 3. Introduce the concepts of polymer science and engineering; Chain Structure and Configuration; Molecular weights and sizes, Concentrated Solutions and phase Separation; Rubber Elasticity; The Amorphous State; Viscoelasticity and Transistions and Relaxations; Crystalline State of Polymers; Morphology of Crystalline Polymers. (Prerequisite: MSEG 0603)
MSEG 0624	POLYMER CHEMISTRY. Cr. 4. A survey course on polymeric materials. Areas covered are the synthesis and reactions of polymers, the thermodynamics and kinetics of polymerization, the physical characterization of polymers and the fabr
