DEPARTMENT OF ADVANCED TECHNOLOGIES

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Degree	Required Admission Test
Master of Science in Applied Science and Technology: Computer Systems and Network Technology	GRE General Test
Master of Science in Applied Science and Technology: Electrical and Electronics Engineering Technology	GRE General Test
Master of Science in Applied Science and Technology: Geospatial Engineering Technology	GRE General Test
Master of Science in Applied Science and Technology: Homeland Security Management	GRE General Test
Master of Science in Applied Science and Technology: Radiological Health Science (Health Physics)	GRE General Test
Master of Science in Applied Science and Technology: Technology Management	GRE General Test

GRADUATE FACULTY
David Addae, Ed.D., Professor of Advanced Technologies
John Adjaye, Ph.D.; Associate Professor of Advanced Technologies
Steve Adzanu, Ph.D., Associate Professor of Advanced Technologies
Kwabana Agyepong, Ph.D., Associate Professor of Advanced Technologies
Maxwell Ankrah, Ph.D., Adjunct
Jessica Buck, Ph.D., Adjunct
Mamie Griffin, Ph.D., Adjunct
Beitollahi Masoud, Ph.D., Adjunct
Sam Nwaneri, Ph.D., Assistant Professor of Advanced Technologies
Erol Sarigul, Ph.D., Associate Professor of Advanced Technologies
Angel Skinner, Ph.D., Assistant Professor of Advanced Technologies
Yufeng Zheng, Ph.D., Associate Professor of Advanced Technologies

MASTER OF SCIENCE IN APPLIED SCIENCE AND TECHNOLOGY

Program Description

Master of Science in Applied Science and Technology is designed to provide access to technical graduate work in Southwest Mississippi and the rural counties served. The intended student audience is all technical undergraduate majors in the areas of engineering, technology, applied science, and physical sciences.

The concentrations are offered with the thesis and project options. Both thesis and project options require a minimum of 36 credit hours to graduate: 30 course hours and 6 hours of ***thesis-and-defense or project-and-defense*.** The two options offer students the opportunity to fulfill their academic aspirations and course requirements through a thesis or non-thesis track.

Stakeholders involved in the design and delivery of this graduate program include the Systems Research Institute (SRI), an Institutions of Higher Learning of Mississippi approved institute, the Department of Advanced Technologies, Industry and Businesses in Southwest Mississippi. The institute operates a technology incubator in

Southwest Mississippi, focused on technology based economic development. There are several centers and labs which comprise the institute. The scientist in the institute and faculty in the Department of Advanced Technologies together with graduates focus on solving technology based problems for business, industry, and entrepreneurs in Southwest Mississippi, the United States, and internationally. Projects are focused on development of prototypes and solving real world industry and business related problems using the partnership of the stakeholders listed.

Advisory Council: The academic advisory committee includes relevant industry partners such as, Grand Gulf, Entergy, Ergon, Engineering Research Development Center (ERDC), and the US Army Corp of Engineers. Federal agencies supporting research of faculty and scientists working with the department of Advanced Technologies and the Systems Research Institute include: DOD, AFRL, SBA, DHS, DOE, NRC, and DOED etc.

The graduate program offers both online and conventional face-to-face classroom delivery of instruction and training. This is intended to maximize the convenience to students from remote locations which are enrolled in the program.

Student Learning Outcomes:

The educational objectives of the Master of Science in Applied Science & Technology Degree program include:

Students should be able to:

1) Understand and communicate mathematics underlying relevant/appropriate research work in engineering, technology, and physical sciences;

2) Effectively use modeling tools/software tools, and implement algorithms on appropriate platforms such as math lab, C++ etc.

3) Use project management tools effectively; and

4) Be able to write a technical report (either thesis or project) that meets graduate school standards.

Admission:

Admission directly into the graduate program requires a 2.75 cumulative GPA with 3.0 minimum in the senior year of undergraduate work from an accredited program. Decisions are made based on the combination of GRE, prior work experience, statement of career goals, and letters of recommendation. Prospective students with work experience or transferable credits will be individually evaluated and are encouraged to apply. Applicants must submit with their application a resume that highlights professional and personal accomplishments, technical expertise, and leadership experience. Undergraduate students in STEM areas may be approved for nine (9) hours of graduate credit toward the completion of the Master's Program requirement in their senior year. With additional nine (9) graduate hours completed during the summer of their graduation year of their bachelor's degree, it is possible to complete both the Bachelor's and Master's degree in five years. Admitted students taking advantage of this program with proper permissions and advising have an opportunity to earn a dual bachelor's and master's degree within five years.

Approval for taking courses toward the M.S. in Applied Science & Technology for undergraduate students at ASU with a STEM related area of study includes a cumulative grade point average of 3.0. Full admission into the graduate program will require a BS degree in Applied Science or Engineering Technology, Mathematics, Physics, Engineering, Technology, Mathematics, Physics, or equivalent with a cumulative bachelor's grade point of 2.75 or higher, with a combined 3.0 in the senior years. Students must satisfy Alcorn State University Graduate school admission requirements. Applicants must submit with their application a resume that highlights professional and personal accomplishments, linguistic abilities, technical expertise and leadership experience.

COMPUTER SYSTEMS & NETWORK TECHNOLOGY

Program Description

The Computer Systems and Networks Technology concentration focuses on Computer Networking and Management, providing advanced study in the implementation and management of information technology. The program covers hardware and software experiences in advanced technologies used in the design, implementation, administration, monitoring, optimization, and maintenance of data communication and computer networking systems in industry. Graduation from this concentration opens up career opportunities in occupations such as: Chief Information Officer, Network Architect, Information Security Officer, Network Administrator, Corporate Technology Trainer, Computer Analyst, Information Systems Consultant, and Technology Integration Specialist.

Course Requirements (Thesis Option)

Core Courses (12 hours Thesis/Non-Thesis Plan)		**Credits**
ST 510	Research Methods in AS&T	3 hrs.
ST 512	Mathematics for AS&T	3 hrs.
ST 514	Computation in AS&T	3 hrs.
ST 516	Project Management	3 hrs.
Thesis and Project Option (6 hours)		**Credits**
ST 610A	Thesis A	3 hrs.
ST 610B	Thesis B	3 hrs.
Restricted Electives (18 hours)		**Credits**
ST 580	Information Security Mgmt.	3 hrs.
ST 581	Network Mgmt. Technology	3 hrs.
ST 582	Network Security	3 hrs.
ST 583	Info. Infrastructure Design	3 hrs.
ST 584	Enterprise Web Development	3 hrs.
ST 585	Distributed Systems & Cloud Computing	3 hrs.
ST 586	Data Science and Big Data Analytics	3 hrs.
ST 587	Information Storage and Management	3 hrs.
ST 588	Cloud Infrastructure and Services	3 hrs.
ST 599	Special Topics (Applied Science and Technology)	3 hrs.
ST 5/6XX	Approved Elective(s)	6 hrs.
	TOTAL	**36 hrs.**

Course Requirements (Non-Thesis Option)

Core Courses (12 hours Thesis/Non-Thesis Plan)		**Credits**
ST 510	Research Methods in AS&T	3 hrs.
ST 512	Mathematics for AS&T	3 hrs.
ST 514	Computation in AS&T	3 hrs.
ST 516	Project Management	3 hrs.

Thesis and Project Option (6 hours)		**Credits**
ST 599	Special Topics in Applied Science and Technology	3 hrs.
ST 615	Project	3 hrs.

Restricted Electives (18 hours)		**Credits**
ST 580	Information Security Mgmt.	3 hrs.
ST 581	Network Mgmt. Technology	3 hrs.
ST 582	Network Security	3 hrs.
ST 583	Info. Infrastructure Design	3 hrs.
ST 584	Enterprise Web Development	3 hrs.
ST 585	Distributed Systems & Cloud Computing	3 hrs.
ST 586	Data Science and Big Data Analytics	3 hrs.
ST 587	Information Storage and Management	3 hrs.
ST 588	Cloud Infrastructure and Services	3 hrs.
ST 599	Special Topics (Applied Science and Technology)	3 hrs.
ST 5/6XX	Approved Elective(s)	6 hrs.
	TOTAL	**36 hrs.**

APPLIED SCIENCE CORE COURSE DESCRIPTIONS

ST 510 – RESEARCH METHODS IN AS & T
(3 credits)
Research design, qualitative and quantitative research, sources of data. Data collection procedures, measurement strategies, questionnaire design, interviewing techniques, content analysis, literature surveys, information data bases, probability testing, and inferential statistics.

ST 512 - MATHEMATICS FOR APPLIED SCIENCE AND TECHNOLOGY
(3 credits)
The course exposes students to concepts of mathematics encountered throughout the physical science, engineering and technology management disciplines. This course explores the diversity of math and is focused on developing quantitative skill and reasoning ability. Topics include mathematical methods to solve graduate level Applied Science, Engineering and Technology Management problems. Includes a research project applying the student's skills and background to an engineering, technology management or science-oriented project

ST 514 - COMPUTATION IN AS&T
(3 credits)
The course is an introduction to computational methods with emphasis on programming and problem solving skills using a variety of software tools. A brief introduction to computer architecture, numbering systems and data representation will be given in the beginning followed by topics introducing students to computational methods, and a systems approach to problem solving. Students learn to plan and design computer programs using defining diagrams and solution algorithms expressed in pseudo-code, and flowcharts.

ST 516 - PROJECT MANAGEMENT
(3 credits)
Provide students with tools to manage projects and operations to ensure that a project is completed on time, within budget, and with high quality by exploring specific techniques for accomplishing those three goals. Prepare students to manage people, budgets, scheduling, and quality of project. This course also prepares students for technical and professional communication. Students will learn how to gather, organize, and present information effectively according to audience and purpose.

COMPUTER SYSTEMS & NETWORK TECHNOLOGY COURSE DESCRIPTIONS

ST 580 - INFORMATION SECURITY MANAGEMENT
(3 credits)
Survey of information security terms, concepts, principles, and applications in data networking environment.

ST 581 – NETWORK MANAGEMENT TECHNOLOGY
(3 credits)
Current technologies to address enterprise wide data communication network management. Topics include planning and deploying hardware and software solutions for enterprise network management.

ST 582 – NETWORK SECURITY
(3 credits)
Survey of security challenges to data communication and computer networks. The topics include evaluation of networks security threats, fundamental configuration of enterprise network devices, and enterprise network security policy development.

ST 583 - INFORMATION INFRASTRUCTURE DESIGN
(3 credits)
Advanced features in providing reliable information infrastructure for organizations. Topics include current and future development of dynamic routing and switching protocols, such as OSPF, BGP, MLS, etc. covers issues on IPv6 and its deployment.

ST 584 - ENTERPRISE WEBSITE DEVELOPMENT
(3 credits)
Latest technology in developing successful web sites on the internet as relates to industry and business applications, including protocols, standards and programming tools. Modern technologies for providing dynamic content with enterprise websites. Topics include creation and management of dynamic web services.

ST 585 - DISTRIBUTED SYSTEMS & CLOUD COMPUTING
(3 credits)
Study of integrated web services to a successful enterprise web presence. Topics include development of web site with multiple integrated services, website performance, and security considerations. Latest technology in developing successful web sites on the internet as relates to industry and business applications, including protocols, standards and programming tools. Modern technologies for providing dynamic content with enterprise websites. Topics include creation and management of dynamic web services.

ST 586 - DATA SCIENCE AND BIG DATA ANALYTICS
(3 credits)
This course provides practical foundation level training that enables immediate and effective participation in big data and other analytics projects and establishes a skills baseline that can be enhanced by further formal training and additional real-world experiences. The course provides a process framework for tackling business problems that leverage big data, a grounding in the theory behind key analytical techniques and an introduction to big data analytics technology and tools. The course has extensive hands-on labs to experience the application of these techniques and tools and includes a final hands-on lab where the course learning is applied to a big data analytics problem.

ST 587 - INFORMATION STORAGE AND MANAGEMENT
(3 credits)
This course covers challenges and solutions for data storage and management. Intelligent storage systems are covered, as well as storage networking, backup recovery and archiving, business continuity and disaster recovery, storage security and virtualization, and managing and monitoring the storage infrastructure.

ST 588 - CLOUD INFRASTRUCTURE AND SERVICES
(3 credits)
The Cloud Infrastructure and Services (CIS) course educates participants about cloud deployment and service models, cloud infrastructure, and the key considerations in migrating cloud computing. For all definitions of cloud computing, the course has resorted to the U.S. national Institute of Standards and Technology as a guide. The course covers technologies required to build classic (traditional), virtualized, and cloud data center environments. These technologies include compute, storage, networking, desktop, and application virtualization. Additional areas of focus include backup/recovery, business continuity, security, and management. Students will learn about the key considerations and steps involved in transitioning from the current state of their data center to a cloud computing environment. Upon completing the course, participants will have the knowledge to make informed decisions about migrating to cloud infrastructure and choosing the best deployment model for their organization.

ST 589 - ADVANCED PROGRAMMING (C#) AND ITS APPLICATION TO INDUSTRY
(3 credits)
The course will cover the following contends: basic Object-Oriented Technology in C# (C++), such as the concepts of class, inheritance, polymorphism, operator overloading, and IO streams; image data input/output manipulations, fundamental pattern recognition and image processing algorithm analysis and implementation, project schedule, documentation and test strategy. Some application examples of image medical diagnostics, industrial inspection, handwriting analysis, face recognition, security and surveillance, etc., will be analyzed in the course.

ST 610A – THESIS A
(3 credits)
Three hours for thesis research including written and oral defense of thesis. Major focus will be on the first three chapters of thesis (Introduction, Literature Review, and Methodology).

ST 610B – THESIS B
(3 credits)
Three hours for thesis research including written and oral defense of thesis. Major focus will be on the last two chapters of thesis (Results & Discussion, Conclusion) and oral defense of thesis.

ST 615 – PROJECT
(3 credits)
Approved industry based project culminating in a prototype and an oral defense of a written project report.

ELECTRICAL AND ELECTRONICS ENGINEERING TECHNOLOGY

Program Description

Electrical and Electronics Engineering technologist conducts research, and designs, develops, tests, and oversees the development of electronic systems and the manufacture of electrical and electronic equipment and devices. From the global positioning system that can continuously provide the location of a vehicle to giant electric power generators, electrical and electronics engineers are responsible for a wide range of technologies.

Course Requirements (Thesis Option)

Core Courses (12 hours) Thesis/Project Options		Credits
ST 510	Research Methods in AS&T	3 hrs.
ST 512	Mathematics for AS&T	3 hrs.
ST 514	Computation in AS&T	3 hrs.
ST 516	Project Management	3 hrs.

Thesis Option (6 hours)		**Credits**
ST 610A	Thesis A	3 hrs.
ST 610B	Thesis B	3 hrs.

Restricted Electives (18 hours)		**Credits**
ST 530	Automation	3 hrs.
ST 531	Electric Machinery	3 hrs.
ST 532	Electronics	3 hrs.
ST 533	Semiconductor Devices	3 hrs.
ST 534	Power System Analysis and Design	3 hrs.
ST 535	Analog Electronic Circuits	3 hrs.
ST 536	Electronic Communications Circuits and Systems	3 hrs.
ST 537	Digital Electronic Circuits	3 hrs.
ST 538	Electromagnetic Fields	3 hrs.
ST 539	RF & Microwave Technology	3 hrs.
ST 5xx	Approved Electives	6 hrs.
	TOTAL	**36 hrs.**

Course Requirements (Non-Thesis Option)

Core Courses (12 hours) Thesis/Project Options		**Credits**
ST 510	Research Methods in AS&T	3 hrs.
ST 512	Mathematics for AS&T	3 hrs.
ST 514	Computation in AS&T	3 hrs.
ST 516	Project Management	3 hrs.

Project	**(6 hours)**	**Credits**
ST 599	Special Topics in Applied Science and Technology	3 hrs.
ST 615	Project	3 hrs.

Restricted Electives (18 hours)		**Credits**
ST 530	Automation	3 hrs.
ST 531	Electric Machinery	3 hrs.
ST 532	Electronics	3 hrs.
ST 533	Semiconductor Devices	3 hrs.
ST 534	Power System Analysis and Design	3 hrs.
ST 535	Analog Electronic Circuits	3 hrs.
ST 536	Electronic Communications Circuits and Systems	3 hrs.
ST 537	Digital Electronic Circuits	3 hrs.
ST 538	Electromagnetic Fields	3 hrs.
ST 539	RF & Microwave Technology	3 hrs.
ST 5xx	Approved Electives	6 hrs.
	TOTAL	**36 hrs.**

ELECTRICAL AND ELECTRONICS ENGINEERING TECHNOLOGY COURSE DESCRIPTIONS

ST 530 – AUTOMATION
(3 credits)
A study of the applications of automation systems, including identification of system requirements, equipment integration, actuators, controllers, and sensors. This course will include selected case studies of automated systems in aerospace, defense, medical, petroleum, transportation, airport operation, and homeland security.

ST 531 - ELECTRIC MACHINERY
(3 credits)
This course introduces the student to the principles of electrical machinery. Topics covered include: Transformers, AC machinery fundamentals, synchronous generators, synchronous motors, induction motors, DC machinery fundamentals, DC motors and generators, AC and DC motor drives.

ST 532 – ELECTRONICS
(3 credits)
This course provides a comprehensive treatment of topics in electronic devices. This course is designed to give the student an understanding of the fundamental theories and applications of electronic devices such as Junction Field-Effect Transistors, Metal Oxide Semiconductor Field-Effect Transistors, Operational Amplifiers, Thyristors, and active filters. Topics to be covered include basic to advance theories of electronics devices such as diodes, Bipolar-Junction transistors, and Operational amplifiers with hands-on laboratories to be complemented by the use of software simulation packages. Also, fundamentals of microprocessors will be explained.

ST 533 - SEMICONDUCTOR DEVICES
(3 credits)
The course introduces the student to the physics and operation of semiconductor devices. Topics include: PN junction diodes, bipolar junction transistors (BJTs), field effect transistors (FETs) such as junction field effect transistors (JFETs), metal oxide semiconductor field effect transistors (MOSFETs), metal semiconductor field effect transistors (MESFETs), thyristors, silicon controlled rectifiers, etc.

ST 534 - POWER SYSTEM ANALYSIS AND DESIGN
(3 credits)
This course covers the methods of analysis and design of electric power systems. Topics covered include: Fundamental principles (phasors, complex power, network equations, balanced three-phase circuits, etc.). power transformers, transmission lines, power flow, symmetrical and unsymmetrical faults, symmetrical components, power system protection power system stability and power system controls.

ST 535 - ANALOG ELECTRONIC CIRCUITS
(3 credits)
The course covers diode circuits such as clippers and clampers, rectifiers and power supplies, BJT and FET amplifiers, oscillators, modulators, demodulators, mixers, filters, operational amplifiers, etc. The course is supported by laboratory exercises and simulation software packages.

ST 536 - ELECTRONIC COMMUNICATIONS CIRCUITS & SYSTEMS
(3 credits)
This course investigates the fundamental concepts of electronic communications systems. Topics include: Amplitude Modulation (AM), Frequency Modulation (FM), Phase Modulation (PM), digital modulation schemes, principles of power spectra and time domain analysis.

ST 537 - DIGITAL ELECTRONIC CIRCUITS
(3 credits)
This course provides a comprehensive treatment of topics in electronic devices. This course is designed to give the student an understanding of the fundamental theories and applications of electronic devices such as Junction Field-Effect Transistors, Metal Oxide Semiconductor Field-Effect Transistors, Operational Amplifiers, Thyristors, and active filters. Topics to be covered include basic to advance theories of electronic devices such as diodes, Bipolar-Junction transistors, and Operational amplifiers with hands on laboratories to be complemented by the use of software simulation packages. Also, fundamentals of microprocessors will be explained.

ST 538 - ELECTROMAGNETIC FIELDS
(3 credits)
The course introduces the student to principles of electromagnetic fields. The course covers vector analysis, electrostatics fields, magnetostatic fields. Maxwell's equations, propagation of uniform plane waves, transmission hues, and waveguides and cavity resonators, antennas.

ST 539 - RF AND MICROWAVE TECHNOLOGY
(3 credits)
The course emphasizes the fundamental concepts of electromagnetic, wave propagation, network analysis, and design principles applicable to modern radio frequency (RF) and microwave engineering. Topics covered are: electromagnetic theory, transmission line theory, transmission lines and waveguides, microwave network analysis, impedance matching and tuning, microwave resonators. Computer aided design (CAD) software packages will be used, power dividers and directional couplers, microwave filters, theory and design of ferromagnetic components, noise and active RF components, microwave and RF amplifier design, oscillators and mixers, introduction to RF and microwave systems. Computer aided design (CAD) software packages will be used.

TECHNOLOGY MANAGEMENT

Program Description

The Technology Management concentration prepares graduates to address today's complex business problems with innovative solutions. Organizations require managers and leaders that understand the importance of business knowledge, technology and innovation in driving organizational value to increase competitiveness. Therefore, the program offers graduates the needed interdisciplinary skills to successfully compete in today's team-oriented, horizontally organized and globally competitive workplace. Graduates are prepared to manage people, processes, and information in public and private sectors. Emphasis is placed on various facets including strategic, behavioral, organizational, and social topics.

Course Requirements (Thesis Option)

Core Courses (12 hours Thesis/Non-Thesis Plan)		**Credits**
ST 512	Mathematics for AS&T	3 hrs.
ST 514	Computation in AS&T	3 hrs.
ST 516	Project Management	3 hrs.
ST 510	Research Methods in AS&T	3 hrs.

Thesis Option (6 hours)		**Credits**
ST610A	Thesis A	3 hrs.
ST610B	Thesis B	3 hrs.

Restricted Electives (18 hours)		Credits
IE 508	Manufacturing Planning	3 hrs.
ST 545	Operations Research	3 hrs.
ST 560	Bus. Plan for New Tech Ventures	3 hrs.
ST 562	New Product Development	3 hrs.
ST 564	Managing for Tech. Innovation	3 hrs.
ST 566	Project Mgmt. and Operations	3 hrs.
ST 568	Total Quality Management	3 hrs.
ST 5xx	Approved Electives	6 hrs.
	TOTAL	**36 hrs.**

Course Requirements (Non-Thesis Option)

Core Courses (12 hours Thesis/Non-Thesis Plan)		Credits
ST 512	Mathematics for AS&T	3 hrs.
ST 514	Computation in AS&T	3 hrs.
ST 516	Project Management	3 hrs.
ST 510	Research Methods in AS&T	3 hrs.

Project (6 hours)		Credits
ST 599	Special Topics in Applied Science and Technology	3 hrs.
ST 615	Project	3 hrs.

Restricted Electives (18 hours)		Credits
IE 508	Manufacturing Planning	3 hrs.
ST 545	operation Research	3 hrs.
ST 560	Bus. Plan for New Tech Ventures	3 hrs.
ST 562	New Product Development	3 hrs.
ST 564	Managing for Tech. Innovation	3 hrs.
ST 566	Project Mgmt. and Operations	3 hrs.
ST 568	Total Quality Management	3 hrs.
ST 5xx	Approved Electives	6 hrs.
	TOTAL	**36 hrs.**

TECHNOLOGY MANAGEMENT COURSE DESCRIPTIONS

ST 545 - OPERATIONS RESEARCH
(3 credits)
Operations management conveys skills in “set plays or thematic groups” as tools to apply to marketplace, through productivity, for competitive advantage. These thematic productivity groups, evolve with socioeconomic and cultural needs or demands in business, starting with natural resource management systems, digital and virtual customization of customers’ and market communities, electronic commerce enterprise, and supply chain logistics. The studies are equipped with the knowledge that technology is equivalent to product modeling, and appeals to direct services in the making of products. Impacts and involvements of mathematics in operations research deal with analysis and cross validation of functions, especially in convoluted systems or networks. The objective of this course is to manage change and available resources to enhance productivity and competition.

ST 560 - BUSINESS PLANNING FOR NEW TECHNOLOGY VENTURES
(3 credits)
Analysis including feasibility (studies and product impact) and creation of a business plan for a new business venture including demand forecasting, financial modeling, selling of the new business idea, and other issues for current business conditions.

ST 562 - NEW PRODUCT DEVELOPMENT
(3 credits)
Explores engineering and business topics important to the development of innovative customer-driven engineering products. Design optimization, innovative thinking and the principles and methodologies of product development are examined. Students are taught the tools, techniques and organizational structures that support new product development.

ST 564 - MANAGEMENT FOR TECHNOLOGY INNOVATION
(3 credits)
This course examines communication and key management functions including: envisioning and strategic planning, creating high performance teams, establishing appraisal/reward systems, and innovation and organizational change. Emphasis on leading innovative technical people, leadership that fosters entrepreneurship, and new forms of organizing.

ST 566 - PROJECT MANAGEMENT AND OPERATIONS
(3 credits)
Provide students with tools to manage projects and operations to ensure that a project is completed on time, within budget, and with high quality by exploring specific techniques for accomplishing those three goals. Prepare students to manage people, budgets, scheduling, and quality of project.

ST 568 - TOTAL QUALITY MANAGEMENT
(3 credits)
This course focuses on the essence, principles, and practices of total quality management (TQM) in industry. The subjects and topics covered are: process improvement, process orientation, service quality, human resources, customer satisfaction programs, quality function deployment, process control and capability, role of inspection, economics of quality, productivity measurement, and learning and organizational performance measures.

GEOSPATIAL ENGINEERING TECHNOLOGY

Program Description

The Geospatial Engineering Technology (GET) has broad emphasis on transportation and natural resources. It is offered in two specialty areas: 1) Transportation and 2) Natural Resource Management (NRM). Both areas are offered with the thesis and project options. The two options offer students the opportunity to fulfill their course requirements and academic aspirations. A total of 24 hours may be selected from the listed restricted electives.

Course Requirements (Thesis Option)

Core Courses (12 hours Thesis Plan)		Credits
ST 510	Research Methods in AS&T	3 hrs.
ST 512	Mathematics for AS&T	3 hrs.
ST 514	Computation in AS&T	3 hrs.
ST 516	Project Management	3 hrs.

Thesis (6 hours)		Credits
ST610A	Thesis A	3 hrs.
ST610B	Thesis B	3 hrs.

Restricted Electives (18 hours)		Credits
ST 540	Composite Mapping & Surface Characterization	3 hrs.
ST 541	Radiation Theory and Applications	3 hrs.
ST 542	Prob. & Stat. Decision Theories	3 hrs.
ST 543	Advanced Computer Cartography	3 hrs.
ST 545	Operations Research	3 hrs.
ST 643	Microwaves Remote Sensing	3 hrs.
ST 5xx	Approved Electives	6 hrs.
	TOTAL	**36 hrs.**

Course Requirements (Non-Thesis Option)

Core Courses (12 hours Thesis Plan)		Credits
ST 510	Research Methods in AS&T	3 hrs.
ST 512	Mathematics for AS&T	3 hrs.
ST 514	Computation in AS&T	3 hrs.
ST 516	Project Management	3 hrs.

Thesis (6 hours)		Credits
ST 599	Special Topics in Applied Science and Technology	3 hrs.
ST615	Project	3 hrs.

Restricted Electives (18 hours)		Credits
ST 540	Composite Mapping & Surface Characterization	3 hrs.
ST 541	Radiation Theory and Applications	3 hrs.
ST 542	Prob. & Stat. Decision Theories	3 hrs.
ST 543	Advanced Computer Cartography	3 hrs.
ST 545	Operations Research	3 hrs.
ST 643	Microwaves Remote Sensing	3 hrs.
ST 5xx	Approved Electives	6 hrs.
	TOTAL	**36 hrs.**

GEOSPATIAL ENGINEERING TECHNOLOGY COURSE DESCRIPTIONS

ST 540 - COMPOSITE MAPPING AND SURFACE CHARACTERIZATION
(3 credits)
This course must cover and complete the following seven mini projects in land surveying: 1 ;) Plane and solid geometry 2) Basic theodolite surveying 3) Compass Surveying 4) Chain surveying 5) Hydrographic surveying 6) Topographic surveying and mapping 7) Leveling, and 8) Resolution of land survey and modern applications of GPS and GIS technologies. The objective is to create balanced geospatial knowledge for students' development in any branch of engineering.

ST 541 - RADIATION THEORY AND APPLICATIONS
(3 credits)
This course builds proper knowledge for students to understand scientific observations and nomenclature schemas for sources of radiation. It presents radiation theory to the student to be able to differentiate between radiometric and photometric observations, applications and symbiology, including properties of radiation--functions, geometry, temperature, and processes. It further deals with artificial sources of radiation for surface and subsurface data (Target) acquisition with commercial applications in agriculture and security initiatives (as with the DOD). The modeling uses radioactive transfer modeling to focus on the determination of properties of natural materials, such as soil, rocks, and minerals; thermal modeling will be utilized for moving vehicles. Secondary or dynamic burden deals with classifications of moving phenomena such as in epidemiology, environmental health, contamination vectors, and military and protected area burden classifications. The demand on this burden is usually acquisition, processing and classification of target signatures.

ST 542 - PROBABILITY & STATISTICAL DECISION THEORIES
(3 credits)
The evolution of society and the needs to communicate faster and over a long distance is ever increasing. This is placing severe emphasis on the definition of human and economic well-being. Although engineering requires details but this course is focused on specifics of communication systems, like analysis and synthetic approaches to communication problems. Homeland security DSS runs on different methods, such as cellphones, internet, scrambled radio channels; some are available on different electromagnetic windows. Therefore, specificity and methodology will facilitate communication network links and the diagnostics of their problems.

ST 543 - ADVANCED COMPUTER CARTOGRAPHY
(3 credits)
This course is an overview of the Homestead, general land use and transportation planning in the U.S. The focus is on physical and constitutional provisions for citizen participation in land ownership, development, including legal practices, federal and state government policies and provisions. Students must take and complete seven state symposia projects involving feasibility and impact studies on environmental, engineering, economic, and management [F (x) 3EM] in four U.S. regions—east, west, north, and south.

ST 545 - OPERATIONS RESEARCH
(3 credits)
Operations management conveys skills in “set plays or thematic groups” as tools to apply to marketplace, through productivity, for competitive advantage. These thematic productivity groups, evolve with socioeconomic and cultural needs or demands in business, starting with natural resource management systems, digital and virtual customization of customers’ and market communities, electronic commerce enterprise, and supply chain logistics. The studies are equipped with the knowledge that technology is equivalent to product modeling, and appeals to direct services in the making of products. Impacts and involvements of mathematics in operations research deal with analysis and cross validation of functions, especially in convoluted systems or networks. The objective of this course is to manage change and available resources to enhance productivity and competition.

ST 643 - MICROWAVES REMOTE SENSING
(3 credits)
Microwave signal is the dominant in communication and information systems; from common radio signals to top military signals and frequencies for jamming and spying on the enemy. Most interesting, the digital and electronic marketplace use microwave signals. This includes the huge internet and all handheld mobile devices like cellphones and GPS units. Further, in the electromagnetic spectrum windows, microwaves have special remote sensing characteristics that create special knowledge among other remote sensing windows and platforms. The objective of this course is to unfold this knowledge and link it with the digital society and electronic markets.

HOMELAND SECURITY MANAGEMENT

Program Description

Homeland Security will be a top priority and a critical issue for local, state, and the federal government as well as the corporate sector in the next decades. As America continues to face threats, the need for professionals with applied knowledge, solid skills, and practical experience will increase.

Graduates of the program will possess proficiency in the research, development, and analysis of security strategies; critical agency infrastructures and their inter-relationships; team leadership and cooperative planning; and formulating and executing integrated, rapid responses to crisis situations. **Note:** The sequence of courses listed applies to students in the dual Bachelors and Master's degree. Other students will select courses in consultation with academic advisor.

Course Requirements (Thesis Option)

Core Courses (12 hours Thesis Plan)		**Credits**
ST 512	Mathematics for AS&T	3 hrs.
ST 514	Computation in AS&T	3 hrs.
ST 516	Project Management	3 hrs.
ST 510	Research Methods in AS&T	3 hrs.
Thesis (6 hours)		**Credits**
ST610A	Thesis A	3 hrs.
ST610B	Thesis B	3 hrs.
Restricted Electives (18 hours)		**Credits**
ST 550	Principles of Homeland Security	3 hrs.
ST 552	Technology for Homeland Security	3 hrs.
ST 553	Critical Infrastructure Analysis	3 hrs.
ST 554	Vulnerability Analysis and Protection	3 hrs.
ST 556	Emergency Management (Fifth Year Fall)	3 hrs.
ST 5xx	Approved Electives	6 hrs.
	TOTAL	**36 hrs.**

Course Requirements (Non-Thesis Option)

Core Courses (12 hours Thesis Plan)		**Credits**
ST 512	Mathematics for AS&T	3 hrs.
ST 514	Computation in AS&T	3 hrs.
ST 516	Project Management	3 hrs.
ST 510	Research Methods in AS&T	3 hrs.
Project (6 hours)		**Credits**
ST 599	Special Topics in Applied Science and Technology	3 hrs.
ST 615	Project	3 hrs.

Restricted Electives (18 hours)		Credits
ST 550	Principles of Homeland Security	3 hrs.
ST 552	Technology for Homeland Security	3 hrs.
ST 553	Critical Infrastructure Analysis	3 hrs.
ST 554	Vulnerability Analysis and Protection	3 hrs.
ST 556	Emergency Management (Fifth Year Fall)	3 hrs.
ST 5xx	Approved Electives	6 hrs.
	TOTAL	**36 hrs.**

HOMELAND SECURITY MANAGEMENT COURSE DESCRIPTIONS

ST 550 - PRINCIPLES OF HOMELAND SECURITY
(3 credits)
This course provides an overview of the essential ideas that constitute the emerging discipline of homeland security. It has two central objectives: to expand the way participants think, analyze and communicate about homeland security; and to assess knowledge in critical homeland security knowledge domains: including strategy, history, terrorism, fear management, crisis communication, conventional and unconventional threats, network leadership, weapons of mass destruction, lessons learned from other nations, civil liberties and security, intelligence and information, homeland security technology, and analytics.

ST 551 - PRINCIPLES OF CONSTRUCTION MANAGEMENT
(3 credits)
The principles of construction management are required for an emergency responder to swiftly serve good purpose during emergencies. For example, the ability to read blueprints and understand basic building construction is a required skill. Secondly, the student is made to know regulations and compliances in order to avoid creating hazard situations in addition to an existing emergency. This knowledge is also important during debris recovery, installation, and management of new shelters in the affected areas.

ST 552 - TECHNOLOGY FOR HOMELAND SECURITY
(3 credits)
This course provides individuals involved in homeland security a broad overview of homeland security technology, information systems, inspections and surveillance technology, communications, knowledge, management and information security. The course focuses on technology as a tool to support homeland security personnel regardless of functional specialty. The methodology used in the course will frame technology in terms of its contribution to deterrence; preemption; prevention; protection; response after an attack.

ST 553 - CRITICAL INFRASTRUCTURE ANALYSIS
(3 credits)
Critical infrastructure protection is one of the cornerstones of homeland security. The National Strategy for Protection of Critical Infrastructure and Key Assets lists 11 sectors: Water, Power & Energy, Information & Telecommunications, Chemical Industry, Transportation, Banking & Finance, Defense Industry, Postal & Shipping, Agriculture & Food, Public Health, and Emergency Services. Based on assigned readings of key government documents, independent reports and expert analyses, the student will gain enough knowledge on the vast scope of activities required to protect the nation's most essential asset.

ST 555 - REMOTE SENSING & DATA ACQUISITION SYSTEMS
(3 credits)
This course exclusively deals with terrain burden—primary or non-dynamic burden includes changes in land use terrain that demands land use/land cover change (LUCC) evaluation. The principal approach to this demand is usually to conduct land use classification(s) using any applicable algorithms. The Critical Infrastructure protection is one of the cornerstones of homeland security. While PDD-63 lists 8 sectors, the National Strategy for Protection of Critical

Infrastructure and Key Assets lists 11 sectors: Water, Power & Energy, Information & Telecommunications, Chemical Industry, Transportation, Banking & Finance, Defense Industry, Postal & Shipping, Agriculture & Food, Public Health, and Emergency Services. Based on assigned readings of key government documents, independent reports and expert analyses, the student will gain a base of knowledge about the vast scope of effort and activities required to protect the nation's most essential assets.

ST 556 - EMERGENCY MANAGEMENT
(3 credits)
This course examines historical and contemporary theories, principles, and practices of Emergency Management, particularly the all-hazards approach and the related processes of mitigation, preparedness, response and recovery. Using a case study approach, the course considers the evolution of Emergency Management and its practical application within government and private-sector institutions. The roles, responsibilities, and duties of Emergency Managers at various levels of government are discussed, as are the relationships between the agencies, organizations, and individuals involved.

ST 557 - DEBRIS CONTROL IN EMERGENCY MANAGEMENT
(3 credits)
This course examines historical and contemporary theories, principles, and practices of Emergency Management, with regards to control of debris. This includes transportation of all-hazardous materials and the process of mitigation and recovery. Using a case study approach, this course research and reproduce some evolutions of debris control during emergency management. Emphasis will be on the practical aspects involving governments and private sector.

ST 558 - EXPLOSIVE IMPACT MODELING
(3 credits)
This course deals with hypervelocity impact engineering and introduces students to understand the theoretical, experimental and numerical analysis of hypervelocity impact due to natural and artificial explosive sources. The modeling deals with international signature of explosive impact and powder metallurgy analysis.

ST 559 - NATIONAL INTERESTS IN FORCE PLANNING
(3 credits)
This course provides students with the fundamentals of force planning, framework of national security; defense planning, U.S. defense strategy, emerging international threats, specific and non-specific threats in commerce, economy, and industry. Students gain global security awareness in this course through visible observations of regional threats and national interests.

ST 650 - TOPICS IN ENERGY & TRANSPORTATION NETWORKS
(3 credits)
Energy and environment are such important issues that the next generation cannot afford to be illiterate about. This course starts with a survey of energy and their impacts on the environment. It emphasizes the production and use of renewable energy. Selected topics will be determined by the polarity of energy (one-way or two-way) at the point of.

ST 651 - FACILITY DEFINITION
(3 credits)

RADIOLOGICAL HEALTH SCIENCE

Program Description

The Radiological Health Science concentration prepares graduates to address/solve applied health-physics problems in an industry, hospital, academia, research, or in any settings where radiation is used for beneficial purposes. The nuclear industry requires professionals who can demonstrate broad technical knowledge, professional judgment in

radiation related issues; ability to work independently, and knowledge in different areas of nuclear related fields. The program prepares its graduates to be able to take up professional jobs in the nuclear related fields, with abilities to conduct advanced research, prepare them to continue doctoral level education. A total of 24 hours may be chosen from the restricted electives below.

Course Requirements (Thesis Option)

Core Courses (12 hours Thesis Plan)		**Credits**
ST 510	Research Methods in AS&T	3 hrs.
ST 512	Mathematics for AS&T	3 hrs.
ST 514	Computation in AS&T	3 hrs.
ST 516	Project Management	3 hrs.
Thesis (6 hours)		**Credits**
ST610A	Thesis A	3 hrs.
ST610B	Thesis B	3 hrs.
Restricted Electives (18 hours)		**Credits**
ST 571	Intro to Radiation Health Physics	3 hrs.
ST 572	Radiation Detection and Measurement	3 hrs.
ST 573	External Dosimetry	3 hrs.
ST 574	Radiation Regulations	3 hrs.
ST 575	Advanced Radiobiology	3 hrs.
ST 576	Internal Dosimetry	3 hrs.
ST 577	Radiochemistry	3 hrs.
	TOTAL	**36 hrs.**

Course Requirements (Non-Thesis Option)

Core Courses (12 hours Thesis Plan)		**Credits**
ST 510	Research Methods in AS&T	3 hrs.
ST 512	Mathematics for AS&T	3 hrs.
ST 514	Computation in AS&T	3 hrs.
ST 516	Project Management	3 hrs.
Non-Thesis Project (6 hours)		**Credits**
ST 599	Special Topics in Applied Science and Technology	3 hrs.
ST615	Project	3 hrs.
Restricted Electives (18 hours)		**Credits**
ST 571	Intro to Radiation Health Physics	3 hrs.
ST 572	Radiation Detection and Measurement	3 hrs.
ST 573	External Dosimetry	3 hrs.
ST 574	Radiation Regulations	3 hrs.
ST 575	Advanced Radiobiology	3 hrs.
ST 576	Internal Dosimetry	3 hrs.

ST 577	Radiochemistry	3 hrs.
	TOTAL	**36 hrs.**

RADIOLOGICAL HEALTH SCIENCE COURSE DESCRIPTIONS

ST 570 - APPLICATION OF NUCLEAR RADIATION IN SOCIETY
(3 credits)
This course starts with technology of nuclear energy, human experience with Peaceful use of nuclear radiation in many fields of science and technology including, medicine, industry, agriculture, safety instruments etc. The impact of nuclear radiation in industry has been estimated to be more than auto-industry economically.

ST 571 - INTRODUCTION TO RADIATION HEALTH PHYSICS
(3 credits)
This course primarily discusses various topics related to atomic structure, quantum mechanics interpretation of atom, origin of radiation, dose calculation for various sources and geometries (both internal and external), effect of radiation on human body, radiation detectors used in safety discipline, concepts of shielding.

ST 572 - RADIATION DETECTION AND MEASUREMENT
(3 credits)
Due to its nature radiation has to be detected and measured through instruments. This course gives theoretical and practical experience in setting up, troubleshooting, calibration, radiation measurement using G-M counters, proportional counters, scintillation counters (NaI detectors) using SCA & MCA, solid-state detectors (Germanium detectors) using MCA, Thermo Luminescence Dosimeter (TLD), Liquid Scintillation Counters associated with radiation detection and measurement at graduate level.

ST 573 – EXTERNAL DOSIMETRY
(3 credits)
To understand the fundamentals of external radiation dosimetry including computations for extended sources. To understand the properties, measurements and dosimetry related to radiation and principles of radiation shielding. Point-Kernel methods and performing calculations based on NCRP 49 documents.

ST 574 - RADIATION REGULATIONS
(3 credits)
Due to its nature radiation (hazardousness), radioactive materials are regulated. This course primarily deals with regulation of radioactive materials by various regulating authorities including NRC, DOE, EPA, States, and local governments. In addition, regulation of radioactive materials at various work places including but not limited to nuclear plants, hospitals, industries, universities, and research laboratories will be discussed.

ST 575 - ADVANCED RADIOBIOLOGY
(3 credits)
This course provides an in-depth study of the biological effects of ionizing radiation on living cells/tissues. Emphasis is placed on analysis and interpretation of data from survival and dose response curves. Topics include cell biology, structure and functions of DNA and chromosomes, the cell cycle, cell/tissue sensitivity and response to radiation, tolerance doses, modification of cell/tissue response to radiation, acute and chronic effects of radiation on various organs and systems, radiation syndromes, somatic and genetic effects of radiation, risks to the embryo and fetus, federal radiation protection laws, and new radiation modalities and treatment techniques.

ST 576 - INTERNAL DOSIMETRY
(3 credits)
Calculation of Internal Dose resulted from exposure of radioactive materials using various approved documents-ICRP2, ICRP 30, ICRP 60, ICRP 66, and MIRD Model. In addition, dose calculation using internal dosimetry related software like IMBA, LUDEP, RADTOOL are performed.

ST 577 – RADIOCHEMISTRY
(3 credits)
This is a graduate level radiochemistry class that gives students a practical experience in handling radioisotopes (sealed and unsealed) measurements techniques, liquid scintillation counting, dating of radioactive materials, sample preparation for gamma spectroscopy, handling radioactive waste materials and other topics of importance.

ST 578 - RADIOACTIVE MATERIAL HANDLING (CRADLE-TO-GRAVE CONCEPT
(3 credits)
Due to its nature and the way that radiation and nuclear materials were introduced to society its proper handling received a lot of attention. This course follows the proper handling of radioactive materials from mining to different chemical processes, applications and usages, post-usage handling when they become wastes, as well as refused part during its part and the suggested proper ways of their storage, process and disposal.

ST 579 – RADIO TRACERS IN INDUSTRY AND MEDICINE
(3 credits)
Radioactive materials have a wide variety application in various segments of industry and medicine. Having the capability of being traced while they are a part of living beings or a component in a system they can be traced to determine the location on those being and provide a means to study them. This application is a big part of nuclear medicine; it also can be used for therapeutic purposes. This course provides detail understanding and case demonstrations of radiotracers at advanced graduate level.

STATISTICS COURSE DESCRIPTIONS

ST 501 - APPLIED STATISTICS I FOR AS&T
(3 credits)
A basic first course in probability and statistics with textbook, examples, and problems aimed toward the business, biological sciences, and economics, social and applied sciences. Frequency distributions, averages, measures of variation, probability; graphical display of data; parameter estimation and confidence intervals; hypothesis tests of mean and proportion; significance tests appropriate to binomial, multinomial, poison, and normal sampling; simple regression and correlation; one-way analysis of variance and covariance; t-test; chi-square test. Pre-requisites: MA 377 or EG 377.

ST 502 - APPLIED STATISTICS II FOR AS&T
(3 credits)
Analysis and interpretation of biological data using two- or higher-way analyses of variance and covariance, multiple regression and correlation, simple comparative methods, and simple designs of experiment. Emphasis is on computer analysis of data.
Pre-requisite: ST 501-Applied Statistics I.

ST 503 - APPLIED LINEAR STATISTICAL MODELS FOR AS&T
(3 credits)
Matrix-based regression and analysis of variance procedures at a mathematical level appropriate for a first-year graduate statistics major. Topics include simple linear regression, linear models in matrix form, multiple linear regression, model building and diagnostics, analysis of covariance, multiple comparison methods, contrasts, multifactor studies, blocking, sub-sampling, and split plot designs.
Pre-requisites: ST501-Applied Statistics I and/or ST502-Applied Statistics II.

ST 504 - DESIGN OF EXPERIMENTS FOR AS&T
(3 credits)
Planning experiments so as to minimize error variance and avoid bias including completely randomized design; randomized complete block design; Latin squares; split-plot designs; sub-sampling; switch-back or reversal designs; incomplete block designs; split-plot design; repeated measure design; crossover design; bioequivalence; efficiency.
Requisites: ST501-Applied Statistics

ST 599 – SPECIAL TOPICS IN APPLIED SCIENCE AND TECHNOLOGY
(3 credits)
This is a graduate level course design for graduate students to investigate a selected or related area/topic in Applied Science and Technology (AS&T) that is not included in the curriculum. The independent study allows the student to explore a topic of interest under the close supervision or guidance of a faculty member. The course may include directed readings, applied work, assisting a faculty member with a research project, carrying out an independent research project, or other activities deemed appropriate.

IMAGE PROCESSING AND PATTERN RECOGNITION COURSE DESCRIPTIONS

ST 610 - ADVANCED RESEARCH TOPICS
(3 credits)
This course covers the topics that reflect the most recent research and development in the Applied Science field. The course is offered in a form of graduate research seminar that closely combines the teaching efforts and the research findings. The lecturers may be invited from outside the campus who are in the frontier of industry or academia. The topic usually reflects new developments in the Applied Science Master's Program field. Offering is based on student and faculty interests.

ST 620 - DIGITAL SIGNAL PROCESSING
(3 credits)
Fundamentals of discrete-time signal processing are presented. The course emphasizes on the basic concepts of discrete linear shift-invariant systems, including sampling, aliasing, quantization, and the reconstruction of analog signals. Extensive coverage of digital filter design, the Z-transform, discrete Fourier transform, and fast Fourier transform is given. It also covers filter structures, round-off noise, finite length register effects, and limit cycles in discrete-time digital systems.

ST 622 - ADVANCED IMAGE PROCESSING
(3 credits)
The course covers the concepts and techniques of modern digital image processing. The topics include image acquisition and display, properties of the human visual system, sampling and quantization, point operations, color representations, nonlinear filtering, contrast and color enhancement, noise reduction, linear image filtering and correlation, image registration, image segmentation, transforms and sub-band decompositions, and dithering and image restoration, object tracking, feature extraction and image recognition.

ST 624 - PATTERN RECOGNITION
(3 credits)
This course will introduce the fundamentals of pattern recognition with examples from several applications areas. It includes topics in Bayes rule, parameter estimation, statistical decision making, measures of classification performance and measures of classification risk, classifier combination, feature selection, non-Parametric decision making, minimum squared error discriminate functions, clustering techniques, artificial neural networks and so on.

ST 626 - PRINCIPLES OF IMAGING
(3 credits)
This course aims to provide the students with a basic understanding of the scientific principles associated with image capture and formation. The topics includes optical imaging, ultrasound imaging, X-ray imaging, magnetic resonance imaging, infrared imaging, microwave imaging, stereo imaging and 3-D imaging, image reconstruction, and so on.

ST 628 - MACHINE LEARNING
(3 credits)
This course will present an introduction to algorithms for machine learning and data mining. It covers topics in supervised learning (generative/discriminative learning, parametric/non-parametric learning, neural networks, support vector machines), unsupervised learning (clustering, dimensionality reduction, kernel methods), learning theory (bias/variance tradeoffs, VC theory, large margins), and reinforcement learning.

MASTER OF SCIENCE IN WORKFORCE EDUCATION LEADERSHIP
(JOINT ASU/MSU PROGRAM)

Dr. David K. Addae (WEL Program Director – ASU)

Degree	**Requirement for Admission**
Master of Science in Workforce Education Leadership	GRE General Test

GRADUATE FACULTY
David Addae, Ed.D., Professor of Advanced Technologies
Kwabena Agyepong, Ph.D., Associate Professor of Advanced Technologies
Steve Adanu, Ph.D., Associate Professor of Advanced Technologies
Jessica Buck, PhD, Adjunct
Angrl Skinner, Ph.D., Assistant Professor of Advanced Technologies

Program Description

This Master's degree program, offered jointly through Alcorn State University (ASU) and Mississippi State University (MSU), will prepare graduates to become facilitators of workforce, industry, and community change that will meet the needs of an increasingly diverse clientele. The main objective of this program is to train students to be employed in workforce education leadership positions at rural community colleges. Courses offered only at ASU may be taken by distance education by MSU students and vice versa. That is, students at either university are encouraged to take some of their courses at the other institution, usually via distance education techniques. (Each institution's name will appear on each diploma.) The program is designed to prepare students to become effective leaders in a variety of rural educational settings, business and industry.

Students will:

- master the necessary concepts to think critically about how organizations function,
- learn a range of methods to diagnose the needs of particular individuals and programs they serve,
- develop the leadership skills and technological competencies required to propose and effectuate interventions to help organizations and communities become more effective, and
- acquire the research and management skills needed to assess the usefulness of their interventions in order to modify and improve them accordingly.

Program of Study Guidelines include:

- 1/2 of the courses must be comparable to the course numbers below
- Up to 6 hours may be transferred or substituted from accredited institution or program
- 6 years' maximum to complete program of study
- 36 hours minimum beyond baccalaureate degree

Application and Registration Process

The admissions process for this program has been designed so that the student will complete only one admissions application packet. Acceptance in this program will require that the student complete an admissions application through the Alcorn State University Department of Advanced Technologies or Mississippi State University. Therefore, it is very important that a primary institution is marked in Section II of the application. If ASU is marked as the primary institution, Alcorn State admissions requirements must be met and the admissions decision will be made by ASU. Students who scored less than 3.0 on the GRE Analytical Writing component must enroll in departmental writing class (ST 597- Introduction to Academic Writing) and pass the class with a grade of B or above. This requirement must be met within one year from the initial enrollment period. Students who fail to comply with this requirement may be dismissed from the program. Likewise, if MSU is marked as the primary institution,

Mississippi State admissions requirements must be met and the admissions decision will be made by MSU. Therefore, all WEL applicants must first be admitted to the Graduate School at their chosen primary institution and clear all holds prior to registration. Please contact your specific department for academic advising. Any exceptions in course requirements must be approved through your academic department and WEL Program advisor. The Operations Unit at Mississippi State University will collect the completed packets from the ASU Graduate School via the ASU Admissions/Contact person and forward a duplicate copy to the ASU WEL Program contact person. The contact persons at each school will complete the registration process for each student.

MSU Contact for WEL Application:
Amy Wallace
MSU Division of Academic Outreach & Continuing Education
P.O. Box 5247
Mississippi State University, MS 39762
Fax: 662-325-3473
E-Mail: AWallace@aoce.msstate.edu

ASU Admissions/Contact Person:
Denease Moore
Department of Advanced Technologies
1000 Alcorn Drive #360
Alcorn State, MS 39096-7500
Phone: 601-877-6494
Fax: 601-877-3941
denmoore@alcorn.edu

Download WEL Registration Form: www.distance.msstate.edu/PDF/MSURegFrm05.pdf

** Internships are offered to enrich your educational experience. The internship requirement may be waived for those students who can document experience comparable to the planned internship.

Course Requirements

Industrial Technology and Workforce Development (12 hours)

Required Courses (12 hours)		**Credits**
IE 500	Research in Industrial & Occupational Education	3 hrs.
IE 579	Federal & State Job Training Programs	3 hrs.
IE 590	Vocational Administration Certification Course **or**	3 hrs.
TKT 8263	Philosophy and Admin of Vocational Education (MSU Option)	
IE 586	Qualitative Research Design **or**	3 hrs.
TKT 8233	Career Planning & Decision Making (WEB-MSU Option)	3 hrs.
TKT 6733	Managing Multimedia Learning Environ (WEB-MSU Option)	3 hrs.
TKT 8763	Seminar in Planning Instructional Tech (WEB-MSU Option)	3 hrs.
TKT 8723	Instructional Design for Industry (MSU Option)	3 hrs.

Approved Electives (24 hours) to be chosen by student under the supervision and approval of his or her Advisor.		**Credits**
IE 519	Industrial Management & Organizational Behavior	3 hrs.
IE 552	School to Work Initiatives	3 hrs.
IE 578	Welfare to Work Programs	3 hrs.
IE 548	Internship in Workforce Development **or**	3 hrs.
TKT 8200	Internship in Vocational Education (MSU Option)	
TI 552	Instructional Planning in Industrial & Vocational Programs	3 hrs.
TI 501	History & Philosophy of Industrial Education	3 hrs.
IE 508	Manufacturing Planning and Control	3 hrs.
TI 550	Delivery of Instruction in Industrial & Vocational Education	3 hrs.
AE 508	Rural Economic & Enterprise Development	3 hrs.
IE 526	Principles & Objectives Evaluation of Vocational Education Students	3 hrs.
	TOTAL	**36 hrs.**

Industrial Education Course Descriptions (IE)

IE 500 - RESEARCH IN INDUSTRIAL & OCCUPATIONAL EDUCATION
(3 credits)
This course will introduce participants to the characteristics and various approaches to designing and conducting qualitative research in industrial and occupational education and market research analysis (feasibility study). Students will gain hands-on experience with qualitative methods and analysis techniques while carrying out a research project related to their field of interest.

IE 508 - MANUFACTURING PLANNING AND CONTROL
(3 credits)
The purpose of IE 508 is to provide students with an opportunity to develop an understanding of production organizations and production product planning. Taking an idea and crossing the gap to market production involves careful planning, production fundamentals, and support of reliable vendors. This three (3) credit unit course bridges the gap and provides students with the fundamentals and building blocks of product concept into market production. The course prepares students for leadership roles in entrepreneurial as well as large production-oriented companies. This course deals with theories and concepts that are essential when considering material slow, management problems, decision making techniques and supporting data base in manufacturing industry. Emphasis is places on information systems and the use of contemporary manufacturing resources and materials requirement planning software and applications.

IE 519 - INDUSTRIAL MANAGEMENT & ORGANIZATIONAL BEHAVIOR
(3 credits)
Industrial Management for workforce education. Topics include Employee Selection, Appraisal, Training, Development, Leadership Motivation, Job Satisfaction and Job Involvement, Working Conditions, and Employee Safety in an industrial environment.

IE 526 - PRINCIPLES & OBJECTIVES EVALUATION OF VOCATIONAL EDUCATION STUDENTS
(3 credits)
Scope, nature, tools, language, and interpretation of elementary statistics. Descriptive statistics; graphical and numerical representation of information; measures of location, dispersion, position, and dependence; exploratory data analysis. Elementary probability theory, discrete and continuous probability models. Inferential statistics, point and interval estimation, tests of statistical hypotheses. Inferences involving one or two populations, ANOVA, regression analysis, and chi-square tests; use of statistical computer packages ®.

IE 548 - INTERNSHIP IN WORKFORCE DEVELOPMENT
(3 credits)
The internship program in workforce development allows the student to learn about the various types of internship program and how to plan and set up and evaluate internship programs at the various levels. Students will have the opportunity to listen to experienced professionals on how to develop and run an internship program and have first-hand experience in setting symbolic intern programs in a particular field of interest.

IE 552 - SCHOOL-TO- WORK INITIATIVES
(3 credits)
This online course is designed to reveal the systematic approach of the transition from the academic environment to the workforce. This course will also focus on the planning, design, implementation, and impact of school-to-work transition reform initiatives. Students will be able to identify the design and reliability of commendable programs, and identify program experiences and impacts linked to schools with the business community as it seeks to improve the transition from school to work. This course will be delivered over the Internet for graduate students enrolled in the Workforce Education Leadership Program.

IE 578 - WELFARE TO WORK PROGRAMS
(3 credits)
This course is designed to assist graduates to understand welfare to work programs and how to assist Welfare recipients to obtain or prepare for regular employment. Graduates will also have group projects on Welfare to Work leadership activities and appraisal of Welfare-to-Work participants' education and employment backgrounds.

IE 579 - FEDERAL & STATE JOB TRAINING PROGRAMS
(3 credits)
This online course is designed to coordinate with federal and state guidelines that are necessary to contingency planning and operations of an association with Agreement States, local officials, other Federal agencies and American governments. Ultimately, this course will examine how real people in real businesses struggle every day with making training "right" for the people who work in those businesses. This course will be delivered over the Internet for graduate students enrolled in the Workforce Education Leadership (WEL) Program.

IE 586 - QUALITATIVE RESEARCH DESIGN
(3 credits)
This course provides an overview of qualitative research methods. Students consider mainstream qualitative research design techniques including case study, grounded theory, ethnography, and phenomenology. Data collection methods are also discussed along with qualitative analysis and reporting techniques. Students are prepared to identify, interpret, evaluate and present qualitative data and to design their own qualitative research study.

IE 590 - VOCATIONAL ADMINISTRATION CERTIFICATION COURSE
(3 credits)
This course is part of a professional development sequence of courses required for certification in trades and industrial teachers in Mississippi. It is consistent with the new vision for teacher education. This course will be based on validated learners' outcome and will include non-traditional methods of evaluation, such as portfolio assessment. Therefore, all activities will be linked to attainment of specific outcomes and performance standards as demonstrated by each student. This course will also enhance the professional research skills of the students by connecting the knowledge of general studies with the knowledge of the professional area, in this case, administration of vocational technical institutions. The course enables students to conduct in-depth research with the professional area of service and contributes to problem solving endeavors in vocational/technical settings.

Trades and Industrial Education Course Descriptions (TI)

TI 501 - HISTORY & PHILOSOPHY OF INDUSTRIAL EDUCATION
(3 credits)
This course ensures that the student knows and can briefly discuss American democratic government to guide the student in establishing social expectations from government, industry, and traditional education. It further provides the students the knowledge to go into the workforce with basic understanding of sociopolitical elements in education. Among these elements are educational approaches in solving social problems, including technological and traditional education, and how these elements define social classes and industrial aptitude of different geopolitical regions. The objective of the course is for students to learn how to create and/or fit a social responsibility distribution and use it to improve social, industrial, and educational workforce systems.

TI 550 - DELIVERY OF INSTRUCTIO IN INDUSTRIAL & VOCATIONAL PROGRAMS
(3 credits)
This course will introduce participants to Delivery Instructions in Industrial and Vocational Programs. Learning the instructional delivery methods provides an invaluable foundation for anyone entering today's workforce development world. Topics covered in this course include the role of instructor, learning theory, learner assessment, instructional methodology, and instructional technology and learning environments. To summarize- "this course will teach how to teach."

TI 552 - INSTRUCTIONAL PLANNING IN INDUSTRIAL & VOCATIONAL PROGRAMS
(3 credits)
This course is required for the Masters of Science Degree in Workforce Educational Leadership Career and Technical Education. The course addresses key knowledge, competencies, and skills required by careers, vocational and technical instructors/specialist or private trainers in developing and studying the problems and practices underlying curriculum construction in Trade and Industrial Education. This course will focus on, but not limited to, the study of problems and practices underlying curriculum construction in Instructional Planning in Trade/Industrial and Vocational programs.