

College of Natural, Applied and Health Sciences

The mission of the College of Natural, Applied and Health Sciences is consistent with the overall mission of the University. The College of NAHS has strong, quality program offerings in the sciences and health professions. The faculty and staff are committed to providing relevant education and services to a diverse student population. The goal is to prepare students to think critically and creatively so that they can adapt to changing social, economic and technological conditions. Building external collaborations with major technological corporations and the health care industry is an integral part of the colleges outreach mission, which enables it to provide valuable services to the community as well as increased opportunities for students.

We are proud to have been designated the Flagship State University for the Health Professions. Our graduates can be found practicing in hospitals and other health care agencies across New Jersey. Also, our programs in the Sciences have a long distinguished record of service to this region. So, whether you are looking to study in the Natural and Physical Sciences, Health Care, Mathematics, Technology, or Computer Science, you will gain a strong foundation at the College of Natural, Applied and Health Sciences.

Interim Dean, Pablo Zafra

Assistant to the Dean, Lourdes F. Prieto

B-104, (908) 737-3600

ACADEMIC DEGREES, PROGRAMS

B.A. in Biology

- General Option
- Honors Option
- Teacher Certification Option
- Teacher of Students with Disabilities Option

B.S. in Biology

- General Option
- Biotechnology Option

B.A. in Chemistry

- General Option
- Preprofessional Option
- Teacher Certification Option

B.S. in Chemistry, Expanded Option

B.S. in Computer Science

- Information Systems Option

B.A. in Earth Science

- General Option
- Teacher Certification Option
- Teacher of Students with Disabilities Option

B. S. in Earth Science

- Earth System Science Option
- Geology Option
- Meteorology Option

B.A. in Mathematical Sciences

- Teacher Certification Option
- Teacher of Students with Disabilities Option

B.S. in Computer Integrated Design and Manufacturing Technology

B.S. in Electronics Technology

B.S. in Telecommunications and Information Technology

HEALTH PROFESSIONS

B.S. in Health Information Management

- General Option
- Occupational Therapy Track

B.S. in Medical Technology

- General Option
- Cytotechnology Option
- Histotechnology Option

B.S.N. in Nursing

Post Baccalaureate School Nurse Program

JOINT (OR COMBINED) DUAL DEGREE PROGRAMS

B.S. in Health Information Management/ M.S. Management Information Systems

B.S. in Health Information Management/ M.A. Communication Studies

B.A. / M.S. in Occupational Therapy

B.A. / DPT Physical Therapy (with UMDNJ)

COLLABORATIVE PROGRAM

BA in Elementary Education Liberal Studies in Mathematics, Science, and Technology:

- Biology Specialization
- Earth Science Specialization
- Mathematics Specialization
- Technology Specialization

DEPARTMENTS, FACULTY

Biological Sciences

Faculty: Codella, Field, Glazer, Hayat, James, Mancarella (Chairperson), Osborne, Porta, Pu, Rosenthal, Vassiliou, Yu, Zhang

Chemistry-Physics

Faculty: Castiglione, Criasia (Chairperson), Gao, Getzin, Hicks, Kampa, Kubow, Lees, Shin, Stokes-Huby, Vitale, Zarrilli

Geology and Meteorology

Faculty: Croft, Dobosiewicz, Krall, Kroll, Manfrino, Metz (Chairperson), Murphy, Ngoy, Yoh, Zois

Mathematics and Computer Science

Faculty: Abeles, Affouf, Alsina, Arnow, Avirappattu, Beaugris, Chang, Deavours, Emanouilidis, Hahn (Chairperson), Halper, Krantz, Lehmann, Lipson, Mathur, Narasimhan, Ryder, Santomauro, Stewart-Gardiner, Tse, Viglione, Wang, Wittenberg, Woubneh, Zafra

Technology

Faculty: Behi, Cokewood, Shahrabi (Chairperson)

Health Information Management

Faculty: Davis, Manger (Chairperson)

Medical Technology

Coordinator: Osborne

Nursing

Faculty: Campbell (Chairperson), Fitzgerald, Fitzsimons, Hascup, Krause-Parello, Neville, Pisani

Occupational Therapy

Faculty: Knis-Matthews, Richard, Stern (Chairperson)

Technology

Chairperson: Dr. Kamal Shahrabi
HI 110, (908) 737-3504

The Department of Technology offers three B.S. degree programs: Telecommunications and Information Technology; Computer Integrated Design and Manufacturing Technology; and Electronics Technology. These programs prepare technically oriented professionals for leadership, management, and service positions in industry, business, education, and government. Our primary purpose is to provide technology related undergraduate, graduate and continuing professional education programs to support the career goals of individuals entering and advancing in technical and managerial positions at all levels of business, industry, and education.

The Bachelor of Science Degree in Telecommunications and Information Technology addresses the growing local and national need for highly skilled workers who are prepared to assume the many technical jobs made in the rapidly changing telecommunications industries. The expansion of digital technologies and the transformation to a knowledge-based economy mean that there will be a demand for well-trained workers in this field for an indefinite period of time in the future. Our program is the only National Association of Industrial Technology (NAIT) accredited Telecommunications and Information Technology program in the State of New Jersey.

The Bachelor of Science Degree in Computer Integrated Design and Manufacturing Technology (CIDMT) is a technical managerial program designed to meet the changing needs of the State of New Jersey modern industries. The program was instituted through a \$4,000,000 New Jersey high technology grant and addresses the growing local and national need for new highly skilled workers prepared to assume the many technical/managerial careers. The expansion of digital technologies and the rapid changing industry transformation to an advanced manufacturing environment means that there will be a demand for well-trained workers in this field for an indefinite period of time in the future. The program is the only NAIT accredited CIDM programs in the state of New Jersey.

The Bachelor of Science Degree program in Electronics Technology addresses the growing local and national need for highly skilled professionals, who are prepared to assume technical positions in the rapidly changing electronics industries. The Electronics Technology undergraduate program is a technical managerial program designed to meet the changing needs of the modern industries. The expansion of digital technologies and the transformation to a knowledge-based economy means that there will be demand for well-trained pro-

professionals in Electronics Technology. Every day we come in contact with various electronic systems such as: radar, computers, medical equipment, tracking systems, and security systems. Electronics Technology provides the engine used to drive these systems. The electronics field has become one of the most prolific and important industries in the world. Electronics is globally significant and accounts for trillions of dollars per year in spending and revenue. The program is fully accredited by the National Association of Industrial Technology (NAIT).

The curriculum in all majors offered by department is built on the University's General Education Core and includes a Technology Core and Management Component in addition to an Area of Specialization. Guided electives permit students to build a program of studies to support their individual career objectives. Included are a sound knowledge and understanding of technical knowledge combined with hand-on applications in a highly computer intensive instructional environment. Students acquire experience in communication skills, humanities and social sciences; and proficiency level in the physical sciences, mathematics, design and technical skills to permit the graduate to capably cope with typical technical production, materials, design and managerial problems.

Scholarships in the Technology Department are available for qualified students. See Financial Aid section.

B.S. DEGREE IN TELECOMMUNICATIONS AND INFORMATION TECHNOLOGY

The Bachelor of Science Degree Program in Telecommunications and Information Technology is designed to provide students with the knowledge and skills required to understand telecommunication and data networks. The Telecommunications and Information Technology program provides the learner with a strong foundation in analog and digital transmission of data; local area network Technology (LANs); wide area network Technology (WANs); internetworking; network operating systems; web site design and management, and, signaling and switching. Transmission of voice, data, and image-based information is an essential part of most corporations' core operations, and is essential to increasing productivity. This program prepares graduates to meet the challenges of today's workforce. The curriculum in this major is built on the University's General Education Core and includes a Technology Core and Management Component in addition to the Area of Specialization. Guided Electives permit students to build a program of studies to support their individual career objectives. The program is fully accredited by the National Association of Industrial Technology.

B.S. DEGREE

Coordinator: Dr. Daniel Cokewood
TECH-100, (908) 737-3502

GENERAL EDUCATION REQUIREMENTS 52-53

FOUNDATIONS REQUIREMENTS 13

GE	1000	Transition to Kean	1
ENG	1030	College Composition	3
MATH	1000	Algebra for College Students	3
COMM	1402	Speech Communication as Critical Citizenship	3
GE	2024	Research & Technology	3

DISCIPLINARY/INTERDISCIPLINARY DISTRIBUTION REQUIREMENTS

<i>Humanities</i>			9
*ENG	2403	World Literature	3
Select two courses from different areas:			
Fine Arts or Art History			3
Philosophy or Religion			3
Foreign Languages			3
Music or Theatre			3
Interdisciplinary			3
<i>Social Sciences</i>			9
*HIST	1000	History of Civil Society in America	3
PSY	1000	General Psychology	3
Select one course only:			
Political Science			3
Sociology or Anthropology			3
Interdisciplinary			3
<i>Science & Mathematics</i>			10
*MATH	1054	Precalculus	3
PHYS	209I	Physics I	4
Biology, Chemistry, Physics, Astronomy, Earth Science, Geology or Interdisciplinary			3
<i>Health/Physical Education</i>			2, 3
ID	1225	Issues Contemporary Health	3
OR			
ID	1010	Leisure in Multicultural Soc	3
OR			
Physical Education			2
CONCENTRATION			6
ECO	1020	Economics I (Macro)	3
ECO	1021	Economics II (Micro)	3
GE/MAJOR CAPSTONE COURSE			3
TECH	4513	Senior Project Seminar	3

*Required Distribution Course

ADDITIONAL REQUIREMENTS	8
CPS 1231 Fundamentals of Comp. Science	4
CPS 2231 Comp. Org. and Programming	4
MAJOR REQUIREMENTS	72
CORE REQUIREMENTS	13
TECH 1200 Introduction to CAD	4
TECH 2900 Prep. of Technical Documents (WE)	3
TECH 2920 Computers in Technology	3
TECH 3220 CAD I	3
AREA OF SPECIALIZATION	32
TECH 1500 Intro to Telecommunications	3
TECH 2504 Digital Circuits and Systems	4
TECH 2506 Data Communications Technology	3
TECH 2925 Internet/Intranet Technology	3
TECH 3510 Microprocessor Theory, Applications and Interfacing	4
TECH 3520 Networking Essentials	3
TECH 3525 Introduction to UNIX/Linux	3
TECH 4524 Internetworking: Switches and Routers	3
TECH 4527 Networking & Administration of PC	3
TECH Elective	3
<i>Management</i>	<i>15</i>
ACCT 2200 Principles of Accounting	3
MGS 3030 Human Resource Management	3
MKT 3410 Basic Marketing	3
FIN 3310 Management of Corporate Finance I	3
TECH 3900 Ind. Stat. & Quality Cont.	3
MAJOR GUIDED ELECTIVES:	12
Selected with approval of area advisor	
TOTAL	132-133

B.S. DEGREE IN COMPUTER INTEGRATED DESIGN AND MANUFACTURING TECHNOLOGY*

The Bachelor of Science Degree in Computer Integrated Design and Manufacturing Technology (CIDMT) is designed to meet the needs of individuals interested in materials processing, design and manufacturing processes. This program is designed to provide theoretical and practical educations in the field of materials, design and manufacturing processes. The students have an opportunity to study the application of computer aided design and computer aided manufacturing (CAD/CAM), statistical quality control tools and application of materials processing and design, work measurement, quality control, lean manufacturing, engineering economy, product design & development, robotics

programming, industrial management, automated warehouse management, manufacturing system design and simulation, production and inventory control, systems integration and networking. The CIDMT curriculum covers a variety of state-of-the-art topics and technologies that are involved in almost every phase of the product development.
 *(For current status of this program, please contact the chairperson.)

B.S. DEGREE

Coordinator: Dr. Mohammad Behi
 TECH-128, (908) 737-3508

GENERAL EDUCATION REQUIREMENTS 53-54

Foundations Requirements 13

GE 1000 Transition to Kean	1
ENG 1030 College Composition	3
MATH 1000 Algebra for College Students	3
COMM 1402 Speech Communication as Critical Citizenship	3
GE 2024 Research & Technology	3

DISCIPLINARY/INTERDISCIPLINARY DISTRIBUTION REQUIREMENTS

<i>Humanities</i>	9
*ENG 2403 World Literature	3
Select two courses from different areas:	
Fine Arts or Art History	3
Philosophy or Religion	3
Foreign Languages	3
Music or Theatre	3
Interdisciplinary	3
<i>Social Sciences</i>	9
*HIST 1000 History of Civil Society in America	3
PSY 1000 General Psychology	3
Select one course only:	
Political Science	3
Sociology or Anthropology	3
Interdisciplinary	3
<i>Science & Mathematics</i>	11
*MATH 1054 Precalculus	3
PHYS 2091 Physics I	4
PHYS 2092 Physics II	4
<i>Health/Physical Education</i>	2, 3
ID 1225 Issues Contemporary Health	3
OR	
ID 1010 Leisure in Multicultural Soc	3
OR	
Physical Education	2
CONCENTRATION	6
ECO 1020 Economics I (Macro)	3
ECO 1020 Economics II (Micro)	3

GE/MAJOR CAPSTONE COURSE	3
TECH 4450 Comp. Integrated Design & Mfg	3

*Required Distribution Course

ADDITIONAL REQUIREMENTS	4
CPS 1231 Fundamentals of Computer Sci	4

MAJOR REQUIREMENTS 74

<i>Core Requirements</i>	<i>13</i>
TECH 1200 Introduction to CAD	4
TECH 2900 Prep. of Technical Documents WE	3
TECH 2920 Computers in Technology	3
TECH 3220 CAD I	3

Area of Specialization 34

TECH 1401 Materials and Processes	3
TECH 2404 Machine Tool / Non-Traditional Processes	3
TECH 2410 Computer Animation/ Rapid Prototyping	3
TECH 2415 Numerical Control Programming	4
TECH 3430 Introduction to CAD/CAM	3
TECH 3439 Computer Integrated Machine Elements Design	3
TECH 4415 Automated Systems Integration	3
TECH 4421 Production-Inventory Control/Warehouse Management	3
TECH 4440 Robotics and Automation	3
TECH 4442 Work Measurement	3
TECH Elective	3

Management 15

ACCT 2200 Principles of Accounting	3
MGS 3030 Human Resource Management	3
MKT 3410 Basic Marketing	3
FIN 3310 Management of Corporate Finance I	3
TECH 3900 Ind. Stat. & Quality Cont.	3

MAJOR GUIDED ELECTIVES 12

Selected with approval of area advisor

TOTAL	131-132
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B.S. DEGREE IN ELECTRONICS TECHNOLOGY

The Bachelor of Science Degree program in Industrial Technology Electronics option addresses the growing local and national need for highly skilled professionals, who are prepared to assume technical positions in the rapidly changing electronics industries. The Electronics Technology program provides the learner with a strong foundation in analog and digital transmission of data; Solid State Design; Microprocessor; Microcontrollers and PLC; Digital Signal Processing; RF Circuit Analysis and Design, and signaling and switching. This program

prepares graduates to meet the challenges of today's workforce. The curriculum in this major is built on the University's General Education Core and includes a Technology Core and Management Component in addition to the Area of Specialization. Guided Electives permit students to build a program of studies to support their individual career objectives. The program is fully accredited by the National Association of Industrial Technology.

B.S. DEGREE

Coordinator: Dr. Ali Setoodehnia
TECH-117, (908) 737-3507

GENERAL EDUCATION REQUIREMENTS 54-55

FOUNDATIONS REQUIREMENTS 13

GE 1000	Transition to Kean	1
ENG 1030	College Composition	3
MATH 1000	Algebra for College Students	3
COMM 1402	Speech Communication as Critical Citizenship	3
GE 2024	Research & Technology	3

DISCIPLINARY/INTERDISCIPLINARY DISTRIBUTION REQUIREMENTS

<i>Humanities</i>		9
*ENG 2403	World Literature	3
Select two courses from different areas:		
Fine Arts or Art History		3
Philosophy or Religion		3
Foreign Languages		3
Music or Theatre		3
Interdisciplinary		3
<i>Social Sciences</i>		9
*HIST 1000	History of Civil Society in America	3
PSY 1000	General Psychology	3
ECO 1020	Economic I (Macro)	3

<i>Science & Mathematics</i>		11
*MATH 1054	Precalculus	3
PHYS 2091	Physics I	4
CPS 1231	Fundamentals of Comp. Science	4

<i>Health/Physical Education</i>		2, 3
ID 1225	Issues Contemp. Health	
OR		
ID 1010	Leisure and Rec. in Multicultural Soc.	3

OR		
Physical Education		2

CONCENTRATION 7

MATH 2411	Calculus I	3
PHYS 2092	Physics II	4

GE/MAJOR CAPSTONE COURSE 3

TECH 4513	Senior Project Seminar	3
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*Required Distribution Course

ADDITIONAL REQUIREMENTS 3

ECO 1021	Economic II (Micro)	3
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MAJOR REQUIREMENTS 72

CORE REQUIREMENTS 13

TECH 1200	Introduction to CAD	4
TECH 2900	Prep. of Technical Documents (WE)	3
TECH 2920	Computers in Technology	3
TECH 3220	CAD I	3

AREA OF SPECIALIZATION 33

TECH 1500	Intro to Telecommunications	3
TECH 2504	Digital Circuits and Systems	4
TECH 2506	Data Communications Technology	3
TECH 2508	Solid-State Devices	4
TECH 3510	Microprocessor Theory, Applications and Interfacing	4
TECH 4511	Microcontrollers and Programmable Logic Controllers	3
TECH 4520	RF Circuit Analysis and Design	3
TECH 4525	Digital Signal Processing	3
TECH	Electronics Elective	3
TECH	Elective	3

Management 15

ACCT 2200	Principles of Accounting	3
MGS 3030	Human Resource Management	3
MKT 3410	Basic Marketing	3
FIN 3310	Management of Corporate Finance I	3
TECH 3900	Ind. Stat. & Quality Cont.	3

MAJOR GUIDED ELECTIVES: 12

Selected with approval of area advisor

TOTAL 130-131

B.A. DEGREE IN ELEMENTARY EDUCATION

OPTION: LIBERAL STUDIES IN MATHEMATICS, SCIENCE AND TECHNOLOGY

TECHNOLOGY SPECIALIZATION K-5 AND 5-8

This is a joint program with the College of Education designed to provide Elementary education students the opportunity to pursue a specialization in science, mathematics, or technology. Students choosing this option must make a formal application for admission to the Elementary, Middle and Secondary (EMSE) Department. Prior to taking education courses, all requirements must be met. Please refer to the Elementary Education program under the College of Education.

GENERAL EDUCATION AND ADDITIONAL LIBERAL ARTS REQUIREMENTS 64

GENERAL EDUCATION REQUIREMENTS 46

FOUNDATIONS REQUIREMENTS 13

GE 1000	Transition to Kean	1
ENG 1030	College Composition	3
MATH 1000	Algebra for College Students	3
COMM 1402	Speech Communication as Critical Citizenship	3
GE 2024	Research & Technology	3

DISCIPLINARY/INTERDISCIPLINARY DISTRIBUTION REQUIREMENTS:

<i>Humanities</i>		9
*ENG 2403	World Literature	3
AH 1700	Art History	3
MUS 1050	Music Fundamentals (Rec.)	3
<i>Social Sciences</i>		9
*HIST 1000	History of Civil Society in America	3
PSY 1000	General Psychology	3
GEOG 2010	World Geography	3

Science & Mathematics 11

*MATH 1010	Foundations of Mathematics	3
BIO 1000	Principles of Biology	4
Select one course:		
PHYS 2041	Gen Physics I	

OR

CHEM 1010	Preparatory Chemistry	4
<i>Health/Physical Education</i>		4
ID 1225	Issues Contemporary Health	3
PED 1101	OR 1103 OR 1105	1

ADDITIONAL REQUIREMENTS 15

PSY 2100	Child Psychology	3
PSY 2110	Psy of Adolescence	3
HIST 2303	US History to 1877	3
HIST 2304	US History 1877 to Present	3
ID 2950	The Child and Technology	3
ID 2955	Disabled Person in Amer Soc	3

ACADEMIC MAJOR 40-43

Math/Science/Technology Basic Requirements 22-23

Mathematics 6

Select two of the following:

MATH 1016	Statistics	3
MATH 1030	Problem Solving in Mathematics	3
MATH 1054	Precalculus	3
MATH 2411	Calculus I	3

<i>Biology</i>		4
BIO 2200 Cell Biology or Biology Elective		
<i>Earth Science</i>		4
Intro course in Astronomy, Geology, Meteorology		4
OR		
ES 1000 Observing the Earth	3-4	
<i>Technology</i>		9
CPS 1031 Intro to Computers	3	
CPS 1032 Microcomputer Appl		
OR		
TECH 2920 Computers in Technology	3	
TECH 1100 Technology Systems	3	
<i>Technology Specialization</i>	18-20	
GCOM 1600 Intro to Graphic Comm	3	
Select from CPS, Technology, or Graphic Communications, including 12 credits at the 3000 level or above, with advisement		
PROFESSIONAL EDUCATION	33	
EMSE 2802 Expl. Tchg./Lab Exp. in Multicultural Elementary Classroom (K-8)	3	
EDUC 3000 Curr. Evaluation & Learner	3	
EDUC 3400 Lang Arts/Read Pre-Schl & Elem Cur.	3	
EMSE 3123 Math & Science in Education	3	
EMSE 3140 Soc Studies & Contemp. Issues in Ed	3	
EMSE 3802 Field Experience in Middle School	2	
EMSE 3300 Middle School Curr & Phil	3	
EMSE 3903 Teaching ELL	1	
EMSE 4800 Prof Intern Elem. Teaching & Curr.	9	
EMSE 4900 Senior Seminar (Capstone)	3	
TOTAL	131-133	

MINOR

Students desiring a minor may fulfill the requirements of a minimum of 22 semester hours including seven semester hours of Industrial Technology core requirements and 15 semester hours selected from a single area of specialization.

REQUIREMENTS 22

REQUIRED CORE COURSES 7

TECH 1200 Introduction to CAD	4
TECH 2900 Prep. of Technical Documents WE	3

SPECIALIZATION COURSES* 15

Selected in one of the following areas of the Technology departmental offerings:

- Computer Integrated Design and Manufacturing Technology
- Electronics Technology
- Telecommunications and Information Technology

*Note: Departmental advisement is encouraged.

TECHNOLOGY COURSES

TECH 1100 Technology Systems (3)

Explores the systems approach to Technology using the input, process, output, feedback and control model. Problem analysis and solution activities will investigate materials, processes, resources, organizations, and products as they apply to the subsystems of construction, manufacturing, communication, and energy/ power/ transportation.

TECH 1200 Introduction to CAD (4)

Application of drafting standards, incorporating: lettering, pencil and ink line work, freehand sketching; and the instrument and computer-aided development of presentation drawings. Geometric construction, orthographic projection, sections and conventions, dimensioning, and descriptive geometry are among the presentation topics.

TECH 1401 Materials and Processes (3)

Study of the science and technology of manufacturing materials and processes through theory and hands-on applications. Properties of metals, polymer, ceramic and composite materials are covered. Applications of casting, molding, forming, joining, machining, and treating processes are introduced.
Prerequisites: None

TECH 1500 Introduction to Telecommunications (3)

An introductory course which provides a foundation in the basic principles essential to understanding technologies used within telephony, data, and telecommunications networks. Hands-on laboratory exercises will be a significant part of this course.

TECH 1503 Passive DC Network Analysis (3)

Considers electrical quantities, units, circuits with emphasis on direct-current principles. Network theorems, laboratory instrumentations and computer-aided design techniques are included.

TECH 1504 Passive AC Network Analysis (3)

Develops concepts, relationships, and circuits with emphasis on alternating current principles. Both sinusoidal and non-sinusoidal concepts are considered. Laboratory and computer-aided design techniques are included.
Prerequisite: TECH 1503.

TECH 2010 Technology Education Foundations and Field Experience (3)

An introduction to the foundations, philosophy, principles and methods of teaching technology education within the context of the general public school environment. Approximately one-third of the class activities are devoted to field observations of technology education programs in multi-cultural, urban, and suburban settings from elementary through senior high schools within New Jersey.
Prerequisites: ENG 1030 and COMM 1402.

TECH 2113 Construction Systems (3)

Explores construction as related to its materials, processes, resources, organization, and products using the systems approach.

Construction inputs, processes, outputs and controls are emphasized through selected laboratory experiences.

Prerequisite: TECH 1100.

TECH 2114 Manufacturing Systems (3)

Explores manufacturing as related to its materials, processes, resources, organization, and products using the systems approach. Manufacturing inputs, processes, outputs and controls are emphasized through selected laboratory experiences.

Prerequisite: TECH 1100.

TECH 2201 Technical Drafting (3)

A comprehensive study of the spatial relationships of orthographic projection as related to auxiliary views, revolutions, intersections, and developments.

TECH 2202 Machine Drafting and Design (3)

Shop processes; the design and application of fasteners, cams, gears, and common mechanisms. Design and preparation of a complete set of working drawings.

Prerequisite: TECH 1200 or 2201.

TECH 2404 Machine Tool Production (3)

A comprehensive study of machine tool operations and setups including aspects of quality control and use of industrial measuring instruments.

Prerequisites: TECH 2421 or permission of instructor

TECH 2410 Computer Animation/ Rapid Prototyping (3)

The detailed study of complex solids modeling, parametric design, animation of objects and mechanisms in virtual space. Laboratory assignments will include complex aesthetic product design techniques.

Prerequisite: TECH 1200.

TECH 2415 Numerical Control Programming (4)

Programming as related to point-to-point and continuous path machining will be experienced by participants. Tape systems, computer numerical control systems, setup and operations will be addressed.

Prerequisite: TECH 2404 or permission of instructor.

TECH 2420 Materials and Processes II (3)

A study of industrial casting, forging, forming, and molding processes. Emphasis is placed on evaluating the cost effectiveness of competing manufacturing processes related to industrial materials.

Prerequisite: TECH 2410.

TECH 2421 Materials and Automated Processes (3)

The study of materials and traditional and automated processes. Production inventory control and group Technology will also be discussed. Laboratory assignments will be assigned to complement the discussions.

TECH 2504 Digital Circuits and Systems (3)

A study of digital circuits and systems. Introduces number system and Boolean Algebra topics. Digital circuits and systems are designed and analyzed. Topics covered

are: logic gates, Flip-Flops, registers, counters, memories, synchronous and asynchronous sequential networks, state machines. The design of combinational logic networks sequential machines will be the primary focus of this course. Special emphasis will be placed on techniques essential to the design of state machines.

Prerequisite: TECH 1504.

TECH 2506 Data Communications Technology (3)

This course will cover a broad range of technical topics from the nature of data and data transmission systems to protocols and data networks. Hands-on laboratory experiences will be a strong component of this course.

Prerequisite: TECH 2504.

TECH 2508 Solid-State Devices (4)

A comprehensive analysis of the wide array of solid-state devices with consideration of major applications. Physical, crystalline and biasing properties are cited. Electrical parameters, operating characteristics and ratings are examined. Laboratory experiences are afforded.

Prerequisite: TECH 1504.

TECH 2900 Preparation of Technical Documents (3)

Writing experience for technical/business related fields. Content will include instruction and experience in writing resumes, frequently used communications, technical reports and specifications.

Prerequisite: ENG 1030.

Writing Emphasis Course

TECH 2920 Computers in Technology (3)

An introductory course covering a broad array of the operational characteristics of modern microcomputers and their application in the improvement of productivity in the work place, and the solution of complex problems in various industrial and business settings.

Prerequisites: CPS 1031 or CPS 1231 or permission of instructor.

TECH 2925 Internet/Intranet Technology (3)

This course covers hypertext markup language (HTML), and more advanced topics related to making tables, frames and forms in HTML documents. The application of images, audio and video in HTML documents will be covered. Also, JAVA programming will be covered.

Prerequisite: CPS 1031 or permission of instructor.

TECH 3020 Principles and Techniques of Teaching Technology Education (3)

A study of the theory and practice of teaching Technology education. Emphasis is placed on planning, presenting, and guiding instruction. Concerns for laboratory safety, student organizations, and teaching diverse student populations are presented.

Prerequisites: TECH 1100, 2010.

TECH 3025 Technology Education Junior Field Experience (3)

Experience in aiding and observing in an industrial arts/technology education laboratory in the field under the guidance and

direction of a cooperating teacher and a University Supervisor during the junior year. Experience is for one full day per week for a semester.

Prerequisites: TECH 1100, 2010, (GPA over 2.5).

Corequisite: TECH 3020.

TECH 3117 Energy, Power, and Transportation Systems (3)

Explores the principles related to transportation technology (moving people and products), energy technology (the ability to do work), and power technology (the measure of the work being done). Emphasis is placed on the systems approach including the inputs, processes and resources, outputs and impacts, and controls related to energy, power, and transportation systems.

Prerequisites: TECH 1100.

TECH 3200 Design Fundamentals (3)

An investigation of the basic aspects and the traditional concepts of design and of their implication to contemporary design.

TECH 3201 Model Design (3)

Planning, material selection and fabrication techniques of model making and their concurrent relationships to the total design process.

Prerequisite: TECH 3200.

TECH 3204 Architectural Drafting (3)

Construction details and fabrication techniques of a small residential building. Preparation of a complete set of working drawings.

Prerequisite: TECH 1200 or 2201.

TECH 3220 Computer Aided Design I (3)

This course presents a comprehensive introduction to methods and applications of computer aided design systems. Emphasis is placed in the use of CAD hardware and software for automating the design processes and implementing the CAD into planning, costing, database design, productivity and automated production.

Prerequisite: TECH 1200 or 2201 or equivalent.

TECH 3230 Computer Aided Design II (3)

This course presents advanced techniques using computer aided design software on a micro-based system. Emphasis is placed on menu macros, customizing for 3-D, script files, and an introduction to AutoLISP programming.

Prerequisite: TECH 3220.

TECH 3250 Advanced CAD (3)

This course presents a comprehensive introduction to the methods and applications of surface, wire and solids modeling using 2D as well as 3D CAD software. Emphasis is placed in the use of the newly emerging expert systems approach to CAD through applications of artificial intelligence and automated design generation Techniques.

Prerequisite: TECH 3220.

TECH 3430 Introduction to Computer Aided Design/Computer Aided Manufacturing (3)

Comprehensive study of computer aided design and computer aided manufacturing (CAD/CAM) applications. The course emphasizes automation in the design process, geometric modeling of engineering parts, and 2-D machining and process mod-

eling for computer numerically controlled machines (CNC).

Prerequisite: TECH 2415 or equivalent.

TECH 3439 Computer Integrated Machine Elements Design (3)

Application of computer aided techniques, mechanical properties of engineering materials, mechanical fits and geometric tolerances, engineering mechanics, strength of materials, factor of safety, and stress analysis in designing machine elements such as shafts, couplings, gears, bearings, belt and chain drives, brakes and clutches, springs, power screws and fasteners. Computer aided design and problem solving Techniques are heavily stressed.

Prerequisites: TECH 1200, TECH 2410.

TECH 3508 Fundamentals of Solid State Circuit Design (3)

Analysis and design Techniques of solid-state analog electronic circuits will be emphasized throughout this course. Computer aided engineering will be utilized in most design applications.

Prerequisite: TECH 2508.

TECH 3510 Microprocessor Theory, Applications and Interfacing (4)

An introduction to 16-bit microprocessor architecture with special emphasis upon the Intel 8086/88 microprocessor family. Assembly language programming, design and interfacing techniques will be covered.

Prerequisite: TECH 2504.

TECH 3520 Networking Essentials (3)

The function and structure of networking communication protocols, TCP/IP architecture, operational characteristics and design of Local Area Networks (LANs) and Wide Area Networks (WANs), and the operation and purpose of internetworking devices will be covered in this course.

Prerequisite: TECH 2506.

TECH 3525 Introduction to UNIX/Linux (3)

This course designed for the technologist who needs to become a proficient user of computer systems with UNIX or Linux operating systems. Emphasis will be placed on hand-on laboratory assignments, which will reinforce classroom lectures.

(1.5 hr Lecture, 3 hr Lab)

TECH 3900 Industrial Statistics and Quality Control (3)

This course presents basic statistics and probability theory as well as basic statistical quality control tools. Topics include frequency distributions, averages and measures of dispersion, normal curve, estimating parameters, central limit theorem, basic probability theory, various acceptance sampling methods, introduction to statistical process control, life testing and reliability.

TECH 4030 Technology Education Curriculum and Laboratory Management (3)

A study of technology education curriculum trends. Emphasis is placed on goal setting, instructional planning, activity sequencing,

material selection, student evaluation, and laboratory management.
Prerequisite: TECH 3020.

TECH 4035 Technology Education Student Teaching (10)

A full-time, full-semester teaching experience in industrial arts/Technology education under the guidance and direction of a cooperating public school teacher and a college supervisor.
Prerequisites: Successful completion of 96 credits with 2.5 GPA. TECH 3020, 3025.
Corequisite: TECH 4030.
Writing Emphasis Course

TECH 4181 Independent Study in Industrial Education (3)

Industrial Education majors are given the opportunity to develop independent projects or research studies in their field. Each student is expected to initiate an independent program of study under the close supervision of a faculty member. Student is responsible for the plan of work, its accomplishment and suitable presentation at completion of course. Hours to be arranged by student and instructor; study shall involve a minimum of 135 clock hours of classroom and/or laboratory work. Enrollment is by permission of advising faculty member and in compliance with University policy concerning independent study.

TECH 4182 Independent Study in Industrial Education II (3)

A continuation of TECH 4181.

TECH 4206 Technical Illustration (3)

Pictorial reproduction with emphasis on the characteristics of axonometric and perspective projection.
Prerequisite: TECH 3200.

TECH 4207 Design Delineation (3)

Rendering Techniques and methods as related to design delineations with an emphasis on industrial practices.
Prerequisite: TECH 4206.

TECH 4210 Design Application (3)

Application of basic design principles in the construction of a series of three-dimensional forms.
Prerequisite: TECH 3200.

TECH 4211 Senior Design Studio Seminar (3)

A studio workshop course for advanced design students. The course involves an individually tailored design project undertaken from initial concepts through the necessary implication and installation details.
Prerequisites: TECH 3200, TECH 4206 and junior/senior standing or permission of instructor.

TECH 4415 Automated Systems Integration (3)

This course introduces automated material handling and storage systems, group Technology and flexible manufacturing systems, automated inspection systems, automatic identification Techniques, plastic injection molding processes, and five-axis CAD/CAM applications.
Prerequisite: TECH 3430.

TECH 4421 Production-Inventory Ctrl/Warehouse Management (3)

Students will be introduced to various production inventory models, forecasting Techniques, master scheduling, inventory management, distribution inventory management, material requirement planning, capacity management, production activity control, project management, and the Just-In-Time approach. Appropriate manufacturing resource planning (MRP) software will be used as instructional vehicles.
Prerequisite: MATH 1051 and TECH 3430.

TECH 4425 CIM Programming and Database (3)

Application of modern object oriented computer programming and database management Techniques in solving computer integrated design and manufacturing. Development of user interfaces, algorithms, database management using standard relational databases and interface to world wide web/Internet/ Intranet.
Prerequisites: TECH 2920, TECH 4415.

TECH 4431 Computer Integrated Production and Inventory Control II (3)

This is the second of two courses. Students will be introduced to capacity requirements planning, input/output analysis, shop floor control, feedback and corrective action, and planning, designing, and implementing computer integrated systems for production and inventory control. Appropriate shop floor control software will be used as instructional vehicles.
Prerequisites: TECH 4421 or permission of instructor.

TECH 4440 Robotics and Automation (3)

Comprehensive study of robotics technology and application of industrial robots. Students are introduced to different robotics programming methodologies. Motion planning, simulation, and experimental projects are essential components of the course work.
Prerequisite: TECH 2415 or equivalent.

TECH 4442 Work Measurement (3)

Production measurement and analysis through motion and time study. Operation and process analysis by various graphic tools. Principles and Techniques in operation and process improvements. Principles, mechanics and implementation of an efficient production system. Computer applications.
Prerequisites: TECH 4421 or permission of instructor.

TECH 4450 Computer Integrated Design and Manufacturing (3)

Application of Computer Integrated Design and Manufacturing (CIDM) hardware and software for industrial projects. Emphasis is placed on using CIDM hardware and software to generate a Computer Integrated Flexible Manufacturing system.
Prerequisite: TECH 4440 or equivalent.

TECH 4511 Microcontrollers and Programmable Logic Controllers (3)

The theory and application of microcontroller and programmable logic controller technology will be covered. Special emphasis will be placed on writing control programs/ladder logic, I/O interfacing, and utilizing computer simulation.
Prerequisite: TECH 3510.

TECH 4513 Senior Project Seminar in Technology (3)

Students will utilize appropriate research, analysis and design tools required to solve a technical problem related to their major technical area of (networking, electronics, telecommunications, etc.). The major intent of this course is to provide the students with the opportunity to synthesize what they have learned in all their technical courses, and solve a timely "real world" problem. Students will produce a working model or prototype of their solution to the technical problem.
Prerequisites: TECH 3510, TECH 3442.

TECH 4520 RF Circuit Analysis and Design (3)

A practical approach to the analysis and design of high frequency amplifiers, oscillators, AM and FM receiver and transmitter circuits. Laboratory experimentation and computer simulation of RF circuits will be emphasized.
Prerequisite: TECH 3508.

TECH 4524 Internetworking: Switches and Routers (3)

This course enhances the learner's theoretical and practical knowledge of the use of switches and routers in local area networks. Hands-on practical experiences will be emphasized throughout this course. (1 fi hr. Lecture, 3 hr. Lab).

TECH 4527 Networking & Administration of PC (3)

Designed to provide student with classroom and laboratory experiences covering the configuration and management of network client and servers. Student will set up operational Windows and UNIX/Linux computer networks.
Prerequisite: TECH 3520.

TECH 4525 Digital Signal Processing (3)

A practical approach to the analysis and design of infinite impulse response, finite impulse response, continuous time, linear, and time invariant filters. Laboratory experimentation and computer simulation of digital filters will be emphasized.
Prerequisites: TECH 2504, MATH 2411.

TECH 4996, 4997, 4998, and 4999 (3)

An opportunity for students majoring in Technology or Industrial Technology to obtain supervised work experience related to their major area of specialization.
Prerequisites: Sophomore standing; 2.5 average in the major; completion of 12 semester hours in major specialization requirements which must include 3 semester hours of study related to the proposed work experience.
Limitations on assignment: Department approval. Departmental elective for Technology Department majors.