TECHNOLOGY EDUCATION

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Academic Programs	Credits
BS: Photographic Imaging	102
BS: Technology Education	64-69
Secondary Teaching Certification	
BSIT: Construction Management	84
BT: Automotive Technology	90
Auto Body	
Auto Mechanics	
BT: Digital Multimedia Technology	100
BT: Graphic Imaging Technology	79-96
Electronic Publishing	
Management	
Screen Printing	
AT: Automotive Technology	60
Auto Body	
Auto Mechanics	
AT: Graphic Imaging Technology	60
Image Generation	
Photography	
Screen Printing	
Minor in Automotive Technology	30
Minor in Building Construction	30
Minor in Imaging Technology	32
Minor in Metals Technology	30
Minor in Photography	30
Minor in Screen Printing	35
Minor in Wood Technology	30

SEQUENCE OF TWO-YEAR AND FOUR-YEAR PROGRAMS
 The Department of Technology Education plans programs using the "ladder concept," allowing a student to complete as much education as desired before entering the work force. Two- and four-year programs are available. Students completing the two-year program may go directly into a four-year program in the same area. The ladder concept allows students to reach the educational goal that best fits their specific needs.

ANCILLARY OPERATIONS
 Screen Graphics and LithoTech are ancillary operations of the Department of Technology Education providing students with experience in graphic arts unavailable elsewhere on campus.

Programs

AUTOMOTIVE TECHNOLOGY
 Two options are available in the automotive field—auto body and auto mechanics. Auto body provides the training needed to repair auto damage incurred in accidents and to restore vehicles to their original appearance and correct body alignment. Auto mechanics provides the training needed to maintain and repair auto-mobile engines and systems.

BT: Automotive Technology
Major requirements—53
AUTO134, 144, 320, 364, 374, 384, 420; ELCT105; TCED141, 251, 254, 456.
Emphasis in Auto Body—37
AUTO121,122, 125, 346, 347, 360, plus 13 credits of electives chosen from auto technology, and BSAD355, 384; ELCT151, 152, 153, 171, 172, 173; PHTO115; TCED142, 252, 390.
or
Emphasis in Auto Mechanics—37
AUTO124, 324, 334, 344, plus 21 credits of electives chosen from auto technology and BSAD355, 384; ELCT151, 152, 153, 171, 172, 173; TCED142, 252, 390.

AT: Automotive Technology
Major requirements—29
AUTO134, 364, 374, 384; INDT315; TCED254, 456.
Emphasis in Auto Body—31
AUTO121, 122, 125, 346, 347, 360; TCED141, plus 5 credits of electives chosen from auto technology, and TCED142, 251, 252.
or
Emphasis in Auto Mechanics—31
AUTO124, 144, 324, 334, 344, plus 11 credits of electives chosen from auto technology, and TCED141, 142, 251, 252.

All students in these two program options must have written two ASE exams by the end of their first year. By the end of the second year, they must have passed a minimum of five ASE tests in their respective option.

CONSTRUCTION MANAGEMENT
 Students learn entry-level skills in management and for residential construction.

BSIT: Construction Management
Major requirements—76
ARCH110, 201, 202, 210, 230, 3S10, 410; CNST107, 110, 115, 120, 130; MECT120; TCED180, 485 (16 credits), plus 7 credits of major electives.
Cognate requirements—8
MATH162, 163

DIGITAL MULTIMEDIA TECHNOLOGY
 Digital Multimedia is a very exciting field which utilizes the computer as its main work tool in developing projects needed by clients.
 Students learn skills such as digital image manipulation and enhancement, 3-D modeling and animation, digital sound mixing and enhancement, digital video editing, interactive

web page design, interactive multimedia, and CD authoring.

BT: Digital Multimedia Technology

Major requirements—80
DGME125, 180, 200, 215, 255, 280, 304, 310, 325, 400, 405; GRPH120; PHTO115, 206, 300, plus 21 elective credits chosen in consultation with adviser.

Cognate requirements—20
ART104, 207; JOUR468 or CMME150; COMM320 or 456; COSC125.

By the beginning of the junior year, students in the Digital Multimedia program must have completed the following core courses with a cumulative GPA of 3.00: DGME125, 180, 200, 215, 255, 280; GRPH120; PHTO115. Those who fail to meet these requirements must either retake these core classes to bring the cumulative GPA to 3.00 or drop from the program.

Students must have a cumulative GPA of 2.75 in their major for graduation.

GRAPHIC IMAGING TECHNOLOGY

Revolutionized by the introduction of computer technology into the industry, the term "graphic imaging" is no longer limited to the field of printing. The industry now emphasizes online publishing and interactive multimedia. Students work extensively with computer applications. Three options are available.

Electronic publishing helps students develop skills in the use of computer applications to produce materials for the printed page as well as for Web and CD-ROM publishing and interactive media.

Management prepares students for managerial roles. Classes foster the basic printing industry skills and teach students how to manage effectively and work with people.

Screen printing provides students with skills needed to work in the field of textile and non-textile applications. This field of graphic imaging is heavily influenced by computer technology.

BT: Graphic Imaging Technology

Major requirements—48
DGME125, 180, 200, 255, 300, 435; GRPH120, 140, 315; GTEC395; TCED456, 495.
Emphasis in Electronic Publishing—32
DGME304, 310, 320, 355, 400, 405; GRPH131, 132.
Cognate requirements—12
ART207, 214, 414

Emphasis in Management—32
GRPH380, 420; INDT320, 450; plus 16 credits of electives
Cognate requirements—16
ACCT111; BSAD210, 355, 374.

Emphasis in Screen Printing—31
DGME310, 320; GRPH316, 360, 420; TCED440, 485 (8 credits).

AT: Graphic Imaging Technology

Major requirements—16
DGME125; GRPH120; INDT315; TCED254.
Emphasis in Image Generation—44
DGME180, 200, 255, 300, 310, 435; GRPH131, 132, 140; plus 8 credits of electives chosen from ART214, 414; DGME320; JOUR250.

Emphasis in Photography—40
DGME255; PHTO115, 206, 207, 220, 240, 280, 330; plus 8 credits of electives chosen from ART214, 414; DGME355; JOUR275; PHTO320, 370, 410; TCED495.
Cognate requirements—4
ART207

Emphasis in Screen Printing—44
GRPH140, 315, 316, 360, 420; TCED440, 485 (8 credits); plus 16 credits of electives chosen from DGME180, 200, 255, 300, 310, 320.

PHOTOGRAPHIC IMAGING

Photographic imaging fosters creativity in the production of visual images. The subject of these images and the method used to create them vary.

Commercial imaging develops skills required by the commercial industry through the use of studio work and on-location shooting in medium- and large-format photography.

Digital imaging utilizes computer technology to create, enhance, or modify photographic images.

Photography encompasses elements of digital and commercial imaging, and adds individual creativity and photojournalism.

BS: Photographic Imaging

Major requirements—75
DGME125, 255, 355; GTEC395; PHTO115, 206, 207, 220, 240, 280, 300, 370, 410; TCED495; plus 16 credits of electives chosen from BSAD210; DGME205, 304, 355, 455; PHTO210, 320, 370, 425; and TCED495.
Cognate requirements—27
ART104, 207, 214, 414; COMM405; JOUR275, 354.

TECHNOLOGY EDUCATION

Students learn skills for teaching technology education at the secondary level.

Bachelor of Science Teaching Endorsement (Secondary Education)

Professional requirements—14
TCED254, 350, 456, 486.
Communication Systems*—11
TCED465, plus 8 credits of electives chosen from ARCH171; GRPH120; MECT121, 122; PHTO115.
Construction Systems*—7
CNST110, plus 3 credits of electives chosen from ARCH201; CNST107, 115, 120, 130.
Energy Systems*—7
TCED466, plus 3 credits of electives chosen from ELCT151, 171, 205.
Manufacturing Systems*—11
TCED470, plus 8 credits of electives chosen from MECT155; TCED141, 180, 251.
Transportation Systems*—7
TCED464, plus 4 credits of electives chosen from AUTO124, 134, 144.
Cognate requirements—12
ENGR370; PHYS131, 132 or 151, 152.
Major Electives—3

Chosen in consultation with adviser.
***Students must fulfill elective requirements for four of the five systems listed above.

Minors

Automotive Technology—30
AUTO121, 122, 125, or 124, 134, 144; TCED141; plus 15 credits of electives chosen from Auto Technology.

Building Construction—30
CNST107, 110, 115, 120, 130; plus 12 credits of electives chosen from ARCH171, 201, 202, 230; CNST215; TCED180, 456.

Imaging Technology—32
ART207; DGME125, 180, 255; GRPH120, 140; plus 8 credits of electives chosen from DGME, GRPH, and PHTO.

Metals Technology—30
MECT121, 122; TCED141, 251; plus 16 credits of electives chosen from AUTO121, 122, 125; MECT155, 185, 186.

Photography—32
DGME125, 255; PHTO115, 206, 207, 220, 280, 330.

Screen Printing—35
DGME125, 255, 300; GRPH120, 131, 140, 315, 316, 360.

Wood Technology—30
MECT121, 122; TCED179, 180, 387; plus 13-14 credits of electives chosen from CNST110, 115, 120; TCED141, 251.

Courses (Credits)

See inside back cover for symbol code.

AUTOMOTIVE TECHNOLOGY

AUTO104 $ (2-3)
Personal Auto Care
Stresses the need for proper procedures in routine automobile maintenance. Helps the automobile owner become a wise consumer with emphasis on how to do simple tune-up, maintenance, and minor repairs. Not applicable to a major or minor.

AUTO115 $ (2-3)
General Auto Body Repair
Basic auto body repair procedures are emphasized using individual projects. Helps the individual be a better consumer. Not applicable to a major or minor.

AUTO121 $ (4)
Fundamentals of Auto Body Repair
Basic theory for metal control in auto body sheet-metal repair procedures. Welding and hand- and power-tool skills are developed on mock-ups or selected damage on automobiles.

AUTO122 $ (4)
Major Panel Repair
Further study and skill development on section and panel repair, automotive construction, component alignment, and preparation for final finish.

AUTO124 $ **(4)**
Automotive Engines
Automotive engine fundamentals. Emphasizes design theory as well as cooling, lubrication, and accessory systems. Lab work includes dis-assembly, inspection, measurement, servicing, and reassembly of engine components.

AUTO125 $ **(4)**
Auto Body Refinishing I
Fundamentals of spray equipment, its usage and care. Emphasis in finishing materials, pro-cedures for spot finishing or complete paint jobs, and preparation of substrata when using urethane-based finishes.

AUTO134 $ **(4)**
Engine Performance I
Automotive tune-up fundamentals and diagnosis. Emphasis given to fuel, electrical, and air system theories, with disassembly, inspection, and reassembly of ignition control devices, carburetors, throttle body units, and injection systems.

AUTO144 $ **(4)**
Automotive Power Train
Automotive power train fundamentals including disassembly, inspection, and reassembly of brakes, standard transmissions, rear-end assemblies, and transaxles.

AUTO200 **(2)**
Automotive Consumerism
Consumer knowledge for everyday challenges and decisions involving automobile ownership. Topics include purchasing a new vehicle, choosing a repair facility, buying auto insurance, leasing, financing a purchase, and dealing with salespeople. When to sell or trade a vehicle along with how to protect your investment is also covered. Not applicable to a major or minor.

AUTO320 **(1-4)**
Service Coordination
Theory and experience in safety and manage-ment principles for automotive shop operations and records. Assignments as lab assistant given. Prerequisites: 12 credits in automotive technology.

AUTO324 $ **(4)**
Engine Rebuilding
Theory and comprehensive repair of automotive engines. Emphasis in bearing, piston, and valve problems, related accessories, and engine diagnostic procedures. Prerequisite: AUTO124 or equivalent.

AUTO334 $ **(4)**
Automotive Electricity
Automotive electrical system. Emphasis in crank-ing, charging, and electronic ignition systems, advanced diagnostic procedures, repairs, and adjustments. Prerequisite: AUTO134 or equivalent.

AUTO344 $ **(4)**
Automatic Transmissions
Automatic transmission including service and repair of the planetary gears, fluid clutches, pumps, hydraulic controls, and holding devices. Students disassemble, inspect, and reassemble given units. Prerequisite: AUTO144 or equivalent.

AUTO346 $ **(4)**
Frame and Body Alignment
Frame and body alignment techniques with emphasis in the use of frame gauges, heavy-duty floor or rack-pulling equipment. Prerequisites: AUTO121, 122.

AUTO347 $ **(4)**
Major Collision Repair
Major collision repair covering skills, tools, equipment, and estimating. Emphasis in panel or section replacement. Prerequisites: AUTO121, 122, 346.

AUTO360 $ **(4)**
Auto Body Refinishing II
Automotive refinishing. Emphasis on advanced finishing systems and spraygun technique for custom finishes including stripping, taping, air brush, and metal flake. Prerequisite: AUTO125.

AUTO364 $ **(4)**
Engine Performance II
Automobile emission control devices, emission standards, air pollutants, and fuel injection systems. Emphasis on testing, diagnosing, repairing, and adjusting emission control devices, and ejection and fuel components. Prerequisite: AUTO134 or equivalent.

AUTO374 $ **(4)**
Suspension and Alignment
Suspension system and alignment of an auto-mobile. Special instruction on the use of 4-wheel alignment and linear balancing equipment. Prerequisite: AUTO144 or equivalent.

AUTO384 $ **(2)**
Automotive Air Conditioning
Thermodynamics of auto air conditioning and comfort controls. Emphasis given to inspection and repair of compressor, dryer, evaporator, condenser, and controls.

AUTO420 **(1-4)**
Automotive Service
Provides experience in automotive diagnosis, estimating, and repair service. Students work on assigned projects. Prerequisites: 30 credits of auto courses with a 3.00 GPA and listed in at least one specialty area by NIASE. Repeatable to 12 credits.

BUILDING CONSTRUCTION

CNST107 **Alt (3)**
Blueprint Reading
Study of blueprints for both residential and commercial structures including specifications, basic symbols, abbreviations, and terminology related to the various building trades. Open to all students.

CNST110 **Alt $ (4)**
Residential Construction
Emphasis in house framing. The use of the steel square, especially as it relates to rafter and stairway construction. Energy-efficient houses and other modern methods of construction are introduced. The safe and proper use of hand and power tools is demonstrated in the classroom and lab. Open to all students.

CNST115 **Alt $ (3)**
Fundamentals of Masonry Construction
Emphasizes the proper use of the trowel. Vocabulary, theory, safety, and practical applications are stressed. Open to all students.

CNST116 **(1-5)**
Construction Practicum
Credit for certified on-the-job construction experience in a skilled building trade. Evaluation of credit is made by the department on an S/U basis. Repeatable in different skills to 10 credits. One of the following is a prerequisite: CNST110, 115, 120, 130. Prior departmental approval required.

CNST120 **Alt $ (4)**
Electrical Construction
Includes code requirements, design and layout of electrical circuits, wiring methods, and commercial applications. Practicum required.

CNST130 **Alt $ (4)**
Plumbing Construction
Includes design and layout of waste and water systems, rough-in methods, and trim. Practicum required.

CNST215 $ **(3)**
Advanced Masonry Construction
Further development of skills acquired in CNST115. Laying of stone as well as various types of brick introduced. Prerequisite: CNST115.

DIGITAL MULTIMEDIA

DGME125 $ **(4)**
Introduction to Digital Technology
Understanding the Macintosh computer, its file handling and storage options. Introduction to word processing, illustration, page layout, and photo manipulation, including scanning and printing. Exposure to multimedia, the World Wide Web, and e-mail.

DGME180 $ **(4)**
Desktop Publishing I
Helps students become proficient in working with publishing projects using page layout software. History of publishing, type, basic copyfitting, and parameters. Attention to importing text and graphics and preparation of documents for prepress and printing. Prerequisite: DGME125 or permission of instructor.

DGME200 $ **(4)**
Computer-Generated Graphics I
Use of personal computers and scanners to generate effective graphic images for desktop publishing and electronic layout and image-setting. Students use current draw programs on the Macin-tosh and the latest scanning technology in conjunction with laser printer and color output. Prerequisite: DGME125 or permission of instructor.

DGME205 $ **(4)**
Image Presentation
Presentation of images from classroom to boardroom using contemporary technology to enhance learning. Includes such techniques as copystand and use of photographic slides and presentation equipment including computer presentations. Prerequisites: DGME125, PHTO115, or permission of instructor.

DGME215 $ **(4)**
Digital Sound Design
Develops skills in dealing with digital sound. Students become familiar with creative con-cepts used in sound and learn how to focus

them toward a specific audience and how to produce sound for use in multimedia presentations. Non-linear editing stressed.

DGME255   **$ (4)**
Digital Imaging
Fundamentals of Photoshop and manipulation of digital photographic images. Emphasis on image manipulation, restoration, tonal adjust-ments, on-screen graphics, and input/output devices. Visual and procedural problems relating to digital imaging are covered along with the final image aesthetics and its technical manipulation. Prerequisite: DGME125. ART207 and PHTO115 recommended.

DGME280   **$ (4)**
Introduction to 3-D Imaging
Basic 3-dimensional modeling, rendering, and animation. Students learn to work in virtual 3-D space on the computer as they model, animate, and apply textures to simple 3-dimensional objects. Prerequisite: DGME200 or equivalent. Basic drawing skills a plus.

DGME300   **$ (4)**
Digital Separations
Deals with basic color theory, the physics of light and color, color measurements, monitor calibration, digital proofing, image acquisition from CD and other hardware, and image output. Applications of color theories to the publishing industry and color separation are emphasized. Prerequisite: DGME255.

DGME304   **$ (4)**
Multimedia I
Survey of leading multimedia software covering principles of digital multimedia production, interactive new media concepts, basic scripting, animation and digital image, and sound manipulation. Prerequisites: DGME200, 255.

DGME310   **$ (4)**
Desktop Publishing II
Desktop publishing through the use of leading page layout, word processing, graphic and photo manipulation programs. Students do complex projects, learn editing, and do color work as it applies to printing. Prerequisites: DGME180, 200, 255 or permission of instructor.

DGME320   **$ (4)**
Computer-Generated Graphics II
Effective ways to create graphic images for desktop publishing and other digital and printing media. Topics include charts, graphs, logos, technical and informational graphics, realistic image rendering, 3-D rendering and integration, and conversion of bitmapped and vector graphics. Prerequisite: DGME200.

DGME325   **$ (4)**
Digital Video
Helps students develop their video skills for multimedia presentations. Reading the audience along with non-linear editing techniques stressed. Students produce video clips for multimedia use. Prerequisite: DGME255.

DGME355   **$ (4)**
Advanced Digital Imaging
Image manipulation using Photoshop, emphasizing high quality input/output and computer hardware as it relates to the requirements of the digital imaging field. Students develop manipulation skills using leading platforms. Prerequisite: DGME255. Repeatable to 8 credits.

DGME400   **$ (4)**
Web Publishing and Graphics
Exploration of the design, storage, retrieval, and delivery of electronic information using text and graphics. Emphasis on publishing via the World Wide Web, kiosks, HTML authoring, and digital formats. Effective organization and planning of data for delivery, ergonomic interface design, and ethics are examined. Prerequisite: DGME304.

DGME405   **$ (4)**
Multimedia II
Survey of multimedia production using leading software. 2-D and 3-D image manipulation and animation are implemented. Topics include interactive new media presentations, television commercials, digital video, kiosks, animation for web pages, and other computer-based presentations. Moderate Lingo scripting is also covered. Prerequisite: DGME304.

DGME435   **$ (4)**
Computerized Prepress and Layout
Advanced software and technology used as tools for layout and camera-ready output relating to the printing process. Special attention to the file preparation, film preparation for imagesetting, and preflighting. Prerequisites: DGME300, 310.

DGME455   **$ (4)**
Digital Collage
Deals with collaging photographic images using Photoshop. Exploration of different programs used in the collaging process and how they all relate to the digital imaging field. Prerequisite: DGME355.

GRAPHIC IMAGING TECHNOLOGY

GRPH120   **$ (4)**
Introduction to Graphic Arts
Surveys the graphic arts profession. Areas include conventional printing and finishing techniques, non-impact printing, electronic publishing, interactive multimedia, and Web publishing. Open to all students.

GRPH131   **$ (4)**
Principles of Printing I
A basic hands-on study of prepress concepts and applications including page layout, graphic arts, photography, film assembly, and plate-making. Designed to provide electronic publishing students with essential prepress concepts and techniques in a logical, sequential order. Prerequisite: GRPH120 or equivalent.

GRPH132   **$ (4)**
Principles of Printing II
Basic concepts of paper, ink, printing, and finishing and how they apply to offset printing. In a practical and intuitive way, students learn to maximize the benefits and avoid or work around limitations inherent in the printing process. Prerequisite: GRPH131.

GRPH138   **$ (2-3)**
Airbrush
Basic airbrush equipment—application, advantages, disadvantages, and care. Emphasis on basic airbrush techniques for rendering images on T-shirts, baking decor, crafts, woods, and commercial illustration. Artistic background not required.

GRPH140   **$ (4)**
Introduction to Screen Graphics
Principles and practices in screen printing with emphasis on stencils, fabric selection, frames, inks, squeegees, screen reclamation, photography, and digital and conventional art work to produce screen printed projects. Open to all students.

GRPH150   **$ (2-3)**
Advanced Airbrush
Further development of airbrush techniques including the rendering of surfaces and textures such as metal, wood, stone, brick, liquids, and clouds. Simple photographic techniques emphasized. Prerequisite: GRPH138.

GRPH315   **$ (4)**
Advanced Screen Graphics—Textile
Work on stencils, digital separations, and screen prep to produce multi-color and process color printing on textiles. Sublimation, transfer printing, puff and specialty inks, foil, and other technological advances are explored. Prerequisite: GRPH140. DGME200, 255, 300 recommended.

GRPH316   **$ (4)**
Advanced Screen Graphics—Non-textile
A study of screens, stencils, and printing techniques to print on paper, vinyls, lexans, metals, glass, etc. The use of lacquers, poster inks, vinyls, enamels, and ultraviolet cure inks studied. Students use a semi-automated flat-bed press and large format presses to produce projects. Prerequisite: GRPH140.

GRPH360   **$ (3)**
Automated Screen Graphics
Principles and functions of automated screen presses including set-up, adjustment, maintenance, troubleshooting, and production of screen printed goods. Prerequisite: GRPH140.

GRPH380   **(4)**
Graphics Services
Prepares individuals as customer service and sales representatives. Professional servicing skills emphasized and practiced using a dynamic-system approach tailored to the quick and in-plant printing industries. Emphasis on techniques used in imagesetting, prepress, press, photocopying, color laser, and post-printing operations. Prerequisites: DGME180, 200, 304, 435.

GRPH420   **(4)**
Cost Estimating—Litho/Screen
Concepts of planning printing production and estimating the cost for printed products. Prerequisites: DGME435; GRPH380.

PHOTOGRAPHY

PHTO115   **$ (3-5)**
Introduction to Photography
Photographic principles of the camera and darkroom techniques with consideration toward the compositional, psychological, and aesthetic attitudes in black-and-white photography.

Darkroom time included.

PHTO206 $ (4)
Creative Photography
Develops the art of photographic perception and use of photography as a visual language. Emphasizes craftsmanship, aesthetics, the art of seeing creatively, problem solving, and the applied use of black-and-white photography. Prerequisite: PHTO115.

PHTO207 $ (4)
Technical Photography
Teaches awareness of the tools and materials available so photographers can develop the craft effectively beyond introductory camera level usage. Shooting allotted for applied situations. Prerequisite: PHTO115.

PHTO210 (3-4)
History of Photography
Historical study of significant contributors in the development of photography and their influence on art and society.

PHTO220 $ (4)
Color Photography
Acquaints students with color materials and their handling and exposure. Aesthetic and commun-icative aspects of color photography stressed in producing visually effective color transparencies. Prerequisite: PHTO115 or permission of instructor.

PHTO240 $ (4)
Photographic Color Printing
Study in color printing using the negative process as it relates to color darkroom techniques. Color digital output and using software for color control will be included. Prerequisite: PHTO220.

PHTO280 $ (4)
Introduction to Studio
Investigation of lighting techniques in standard-equipped studio, emphasizing portraiture, commercial illustration, and experimental techniques in the black-and-white film medium. Prerequisites: PHTO115, 206.

PHTO300 (3)
Media Ethics
Understanding the influence and role the media has in who we are and what we value. Provides a language and a forum for discussion on the media and how they influence our lives.

PHTO310 (3)
Trends in Photography
A historical and contemporary study of significant contributors in the development of photography and their influence on art and society.

PHTO320 $ (4)
Advanced Color Photography
An image-oriented course, drawing on students' background in color comprehension; photographic, technical, and aesthetic understanding; and working knowledge of emulsion and digital photography. Emphasizes producing comprehensive color images. Prerequisites DGME255; PHTO220.

PHTO325 (4)
The Photographic Career
Specific problems photographers encounter when setting up and managing their professional

photography business. Discussion includes Christian ethics, client interaction, graphic houses, photography labs, copyright issues, and assisting. Prerequisite: PHTO280.

PHTO330 Alt $ (4)
Studio Portraiture
Studio applications of people photography including a study of professional lighting techniques used in studio portraiture. Prerequisite: PHTO280.

PHTO370 $ (4)
Advanced Studio in _____
An individual approach to an advanced level of studio photography. The student is able to choose a concentration in portraiture, people/ fashion, still life, advertising/illustration, or location photography. Emphasizes visual concepts and challenges of the commercial photo industry. Prerequisite: PHTO280. Repeatable to 12 credits.

PHTO375 $ (4)
Advanced Photojournalism
Study of the production of photography for use in publications. Discussions include photographic truth, photographic cropping and sizing, and the photographic assignment. Students do photojournalism work for actual publications. Prerequisite: JOUR275. Repeatable to 8 credits.

PHTO390 $ (2-4)
Independent Study in Photography
Further study of photography under direction of instructor. Prerequisite: PHTO115 or equivalent and approval of the instructor. Repeatable to 12 credits.

PHTO410 $ (3-4)
Advanced Creative Photography
Designed for the advanced photographer to investigate personal potential in visual exploration and experimentation. Discussion involves developing an open-minded approach toward individual thought and performance. Understanding photographic materials and techniques is a necessity for class entrance. Prerequisite: PHTO206 or permission of instructor. Repeatable to 12 credits.

PHTO425 (4)
Travel Photography Workshop
Designed to be done in conjunction with on-location photography; provides a background in the specific needs related to travel. Photo-graphing people and their land in foreign environments is emphasized. Unique materials and equipment are discussed as they relate to travel photography. Prerequisite: PHTO115.

TECHNOLOGY EDUCATION

TCED100 $ (1-2)
Crafts
An introduction to craft materials and their use. Emphasis on vocational and recreational use of craft media.

TCED125 (4)
Introduction to Technology
Helps students understand modern tech-nologies. Selected areas of technology explored as to the how and why of technology, what makes up technology, and how a student can develop technological skills.

TCED141 $ (2-4)
Welding Technology I

Oxyacetylene and electric welding processes including oxyacetylene welding, cutting, and brazing; basic shielded metal arc welding and basic gas metal arc welding. One lecture and one 3-hour lab per week constitute 2 credits. Additional credit is earned on the basis of one 3-hour lab per week for each lecture credit.

TCED142 $ (2-4)
Welding Technology II
Further development of the shielded-arc welding processes in out-of-position welding of pipe, cast iron, and alloy metals. Not offered every year. One lecture and one 3-hour lab per week constitute 2 credits. Additional credit earned on the basis of one 3-hour lab per week for each lecture credit.

TCED179 $ (2)
Wood Turning
Instruction and practice on the wood lathe covering safety and the basic operations used in spindle and face-plate turnings. Projects are of a useful and artistic nature. Open to all students.

TCED180 $ (3-4)
Fundamentals of Woodworking
Emphasis in design, wood identification, and the construction of appropriate projects from drawings. Safety and proper use of woodwork-ing machines and common hand tools stressed. Two lectures and one 3-hour lab per week constitute 3 credits. Additional credit earned on the basis of one 3-hour lab per week for each lecture credit.

TCED194 (1-4)
Project Course
Development of a skill in a given area by working independently under the supervision of the instructor. Prerequisite: Permission of instructor. Repeatable to 4 credits.

TCED200 (1-4)
Technology Project Course in_____
Gives the student an opportunity to obtain cred-it in a skill area for which no corresponding course exists. Evaluation of credit must be approved by the dean of the college, the department chair, the Academic Records Office, and the instructor. Repeatable.

TCED248 (1-4)
Workshop
Provides flexibility for the occasional workshop where it is appropriate to offer technology education credit. Requirements must be approved by the department.

TCED251 Alt $ (3-4)
Machine Shop I
Basic set-up and operation of lathes, milling machines, grinders, drilling machines, and shapers; safety, machine maintenance, off-hand tool grinding, layout, and inspection emphasized. Two lectures and one 3-hour lab per week constitute 3 credits. Additional credit earned on the basis of one 3-hour lab per week for each lecture credit.

TCED252 $ (3-4)
Machine Shop II
Machine-shop practices emphasizing advanced lathe set-up and operation, blueprint reading, machine grinding, introduction to NC

machines, and related practices. Not offered every year. Two lectures and one 3-hour lab per week constitute 3 credits. Additional credit earned on the basis of one 3-hour lab per week for each lecture credit.

TCED254 **(4)**
Technical Space Utilization
Acquaints students with the planning and organization of technical facilities. Consideration given to space requirements, building structure, material flow, equipment needs, site location, and environment control of such facilities.

TCED275 **(1-4)**
Topics in _____
Repeatable in different areas.

TCED300 **$ (1-2)**
Advanced Crafts
Advanced study in the area of crafts, which may include art metal, basketry, ceramics, fabrics, flower-making and arranging, glass, needlecraft, paper, plastics, printing, wood, yarn. Prerequisite: TCED100. Repeatable to 8 credits.

TCED350 **(3)**
Teaching Technology Education
Teaching methods and strategies applicable to the teaching of Technology Education at the secondary level. The developing of specific learning experiences and learning through problem solving is covered. Prerequisite: Permission of instructor.

TCED387 **Alt $ (4)**
Furniture Design and Construction
Furniture design, construction, and finishing methods. The use of jigs as related to wood-machining processes. Projects chosen in consultation with instructor. Prerequisite: TCED180.

TCED390 **(1-3)**
Internship
On-the-job training for students seeking industrial experience which cannot be simulated in a classroom setting. A range of 120-150 clock hours of work are required per credit. Selected in consultation with the student's adviser. Repeatable to 9 credits.

TCED440 **(1-2)**
Senior Project
A project made during the student's senior year representing his/her major area of interest and ability. Work is supervised by one of the departmental faculty. Each project, properly identified, may become the property of the department. Repeatable to 4 credits.

TCED454 **g (3)**
Shop Planning and Organization
Floor-plan layout for general and unit shop activities. Organization for laboratory and project instruction. Efficient use of equipment and supplies. Safety and state laws related to shop practice.

TCED455 **g (3)**
Shop Maintenance
Study of the principles and procedures followed in routine maintenance and repair of tools and equipment used in technology education programs.

TCED456 **(4)**
Safety and Loss Control
Safety and the fundamentals of accident prevention with emphasis on schools, school laboratories, and industrial applications. Introduction to the total problem of loss control in industry, including the legal implications for both school and industry. Emphasis on the problem of accident prevention and control.

TCED460 **g(4)**
Industrial Safety
Introduction to the study of loss control in industry with emphasis on the problem of accident prevention and control; includes history, organization, identification, and appraisal of accident-producing conditions and practices.

TCED464 **Alt (3)**
Transportation Technology
The field of transportation as related to Technology Education at the secondary level. Material handling; transportation involving space and atmospheric, marine, and terrestrial modes included.

TCED465 **Alt (3)**
Communication Technology
Study in the field of communications as related to the secondary level in Technology Education. Emphasis on broadcasting, computers, drafting, photography, graphic arts, telecommunications, and their effect on society.

TCED466 **Alt (3)**
Energy Utilization
Study of different types of energies used by modern society, how they have changed society, and implications for the future.

TCED470 **Alt (3)**
Manufacturing Technology
Study of the manufacturing process as it relates to the teaching of Technology Education at the secondary level. Emphasizes materials and processes, research and development, management, marketing, and sales.

TCED485 **(1-4)**
Topics in _____
Repeatable in different areas.

TCED486 **Alt g (3)**
Course Development in Technology Education
Developing a philosophy of industrial arts and vocational education with emphasis on course objectives, content selection and arrangement, tests, and lab activities. Material is developed into a useful course of instruction.

TCED488 **(1-6)**
Technology Education Workshop
Subject to be designated each time offered. Repeatable to 6 credits.

TCED490 **g (1-6)**
Independent Study
Open to students who have gained a good understanding of a specific area, but desire further study beyond the classes being offered. Graded S/U. Repeatable to 6 credits.

TCED494 **g (4)**
Project Course
Achievement of skills in planning and design through individual research and development of an advanced project under the direction of a staff member. Prerequisite: Permission of department chair. Repeatable to 6 credits.

TCED495 **(1-4)**
Portfolio Development
Helps the student develop a traditional or electronic portfolio for employment or continuing educational purposes. Emphasis in direction, development, and refinement of the individual portfolio. Repeatable to 12 credits. Prerequisites: minimum of 30 credits in a major and permission of instructor.

TCED554 **(4)**
History and Development of Technology Education
Cultural influences in history which have shaped technology education. Current developments, trends, and philosophical viewpoints.

TCED555 **(3)**
Administration of Technology Education
Study of administrative problems related to various aspects of a technology education program; procurement of personnel and equipment, physical plant appraisal, finance.

TCED560 **(3)**
Philosophy of Occupational Education
Rationale of vocational-technical training and its integration into the total educational spectrum. Consideration of problems relating to students, staff, and facilities in an efficient occupational educational system. Special emphasis on post-secondary programs.

TCED595 **(variable)**
Readings in Technology Education
Repeatable to 6 credits. Prerequisite: Permission of department chair.

TCED597 **(variable)**
Independent Study
Individual study or research under the direction of a staff member. Repeatable to 6 credits. Prerequisite: Permission of department chair.

TCED698 **(variable)**
Research Project
Research methods and a research project in an area of technology education.