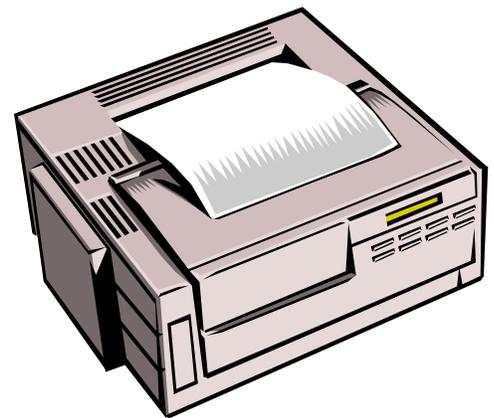


NORTH DAKOTA STATEWIDE SECONDARY GRAPHIC ARTS CURRICULUM GUIDE



NORTH DAKOTA
DEPARTMENT OF CAREER & TECHNICAL
EDUCATION

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GRAPHIC ARTS TECHNOLOGY

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ACKNOWLEDGMENT

This document is a product of the North Dakota Graphic Arts Curriculum Committee and a partnership between the North Dakota Department of Career and Technical Education and North Dakota Public Schools.

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INTRODUCTION

A meeting was conducted to explore the possibility of updating the Graphic Arts statewide curriculum guide. Joe Ford, Jerome Gunderson, Arlyn Nelson, and Don Roloff attended this organizational meeting. Don Roloff, Supervisor, Trade, Industry, Technical and Health, informed the committee that a curriculum grant was obtained through the Department of Career and Technical Education and that a plan of action could be developed to proceed with the curriculum update. The first meeting concluded with a plan to proceed.

Joe Ford and Arlyn Nelson would review the tasks and insert current technology and practices into the task list as well as remove dated processes. A listing of projects would be developed to demonstrate the various hands on activities used in the classroom and labs. The statewide guide would also be reviewed for its content. This guide includes information on:

1. Task Identification
2. Career Opportunities
3. Integrated Academics
4. List of Projects

Tasks that students must master in order to enter gainful employment within the industry are identified. Each task must have other components added to become part of a useful curriculum delivery system:

1. Student performance objectives for each task.
2. Instructional materials that teach the performance objectives.
3. Test items to measure student performance for each objective.
4. A system to document and report student mastery of the objectives.

It was also determined that the academic components need to be identified as part of the integration into the curriculum. The infusion of appropriate basic advanced skills in mathematics, science, and communication are essential if learners are to complete the program and become skilled workers. Leadership skills and team concepts are integrated into the curriculum using SkillsUSA, a career and technical student organization for the Trade, Industry, Technical, and Health programs. The committee in the development of the statewide Graphic Arts curriculum guide took these issues into consideration.

PHILOSOPHY

We believe that...

...the individual is the most important resource in our world today. The program should center on individuals who desire vocational training or wish to explore, with possible hopes to pursue a vocation. We must dedicate ourselves and spare no effort to assist and encourage the highest development of each individual's potential. It is our duty to provide training for the individual in a facility and environment similar to that of the industry. The ultimate goal of our instruction should include the various phases and related fields of the industry, along with the basic skills and people skills needed to obtain an entry level position in the industry.

... today our nation is in need of advanced technologies that successfully compete in order to obtain a more advantageous position in the world market. The core of this need depends on individual workers. Their abilities, dedication, pride, and values determine achievement toward our nation's national and international goals.

... a constant effort must be made to recruit and train individuals to meet new demands for skilled persons needed for jobs created by advanced technology in production, sales, services, and research and development in the graphic arts industry.

DESCRIPTION

The program emphasizes comprehensive graphic arts production skills including typography, layout and design; computer assisted typesetting and electronic page make-up, paste-up, process photography, offset press, finishing operations, and planning and estimating. Emphasis is on successfully completing those processes in a manner that duplicates the methods, equipment, and jobs common to the graphics industry. This is accomplished through a competency-based curriculum which allows students to progress at their own speed and work on "live" production work. Students also have the opportunity to develop leadership and people skills through participation in SkillsUSA.

VOCATIONAL GRAPHIC ARTS

GENERAL OBJECTIVES

Vocational Graphic Arts is a study of related fields within the printing industry united in the ultimate goal of optimum production and service technology. These areas include Design, Layout, Typography, Computer Technology (Desktop Publishing, Electronic Publishing), Paste-up, Image Generation, Process Camera Techniques, Darkroom Techniques, Prepress Operations, Offset Press and Duplicator Operations, Finishing, and Bindery, Screen Printing, Sandblasting, and Vinyl Cutting. Students gain knowledge and skills in various career fields through a simulated industrial environment.

Students who successfully complete this curriculum in graphic arts skills:

1. Evaluate career opportunities through an exploratory experience, which aids career decision making in the world of graphic arts and entrepreneurship.
2. Explore opportunities in a post-secondary educational program.
3. Attain job seeking/job keeping skills.
4. Evaluate actual and anticipated labor market demands.
5. Develop interactive communication skills, including Human to Human, Human to Machine, Machine to Machine, and Machine to Human communication systems.
6. Express knowledge of processes, systems, terminology, and basic skills in related areas of Graphic Communication Technology.
7. Apply measurement, math, scientific principles, and problem solving skills to Graphic Arts processes.
8. Handle individual materials associated with Graphic Arts processes in a safe manner. Informing students on the use of material safety data sheets will be included.

Specific Objectives are found at the beginning of each unit of instruction in the instructional materials.

TASK LIST FOR GRAPHIC ARTS

I. Introduction

- A. Overview of the industry
- B. Major printing process
 - 1. List and explain each of the major printing processes
- C. Breakdown of business and technical production flow.
 - 1. Match job titles with descriptions of job duties.
 - 2. List the proper sequence of production steps
 - 3. List the steps for initiating a printing jobs
 - 4. Complete job tickets
- D. Job ticket communication between departments
 - 1. Define quality criteria
 - 2. Describe job specification form a sample job ticket
- E. Safety
 - 1. List safety rules for housekeeping, fire, electrical, first aid, hand tools, machines, and shop policies
 - 2. Identify colors of safety code
 - 3. Identify classes of fires
 - 4. Identify types of fire extinguishers
 - 5. Demonstrate how to read MSDS sheets (material safety data sheets)
 - 6. List proper sequence of steps in case of an accident
 - 7. Demonstrate personal safety
 - 8. Demonstrate general safety precautions
 - 9. Demonstrate the ability to keep a clean, orderly and safe work area
 - 10. Demonstrate proficiency in first aid
- F. Copyright Laws
 - 1. Name three elements of a copyright law
 - 2. Identify elements of the U.S. copyright law
 - 3. Identify “fair use” of copywritten material, both published and electronic
 - 4. Select items that may or may not be copyrighted
 - 5. Determine local printing trade customs
- G. Applying for a job
 - 1. Write a resume using technical skill
 - 2. Prepare a personal portfolio
- H. Basic Math and Measurement Skills
 - 1. Add and subtract decimals
 - 2. Add and subtract fractions
 - 3. Convert fractions to decimals
 - 4. Convert decimals to fractions
 - 5. Convert feet to inches and vise versa
 - 6. Calculate area and volume

7. Calculate simple percent and discounts
8. Calculate time and money relating to a production job
9. Convert the printer's point system to inches
10. Identify basic measuring tools
11. Use measuring tools to accurately measure to 1/16 inch
12. Use a line gauge to measure picas and points
13. Use a proportional wheel to calculate reduction and enlargement

II. Leadership

A. SkillsUSA

1. Identify the steps of a presentation
2. Identify the advantages of a "team"
3. Conduct a meeting
 - a. Parliamentary procedure

III. Art & Copy Preparation

A. Design

1. Copy planning
 - a. Identify illustrations as line or halftone
 - b. Make a series of thumbnail sketches
 - c. Describe a gripper margin
 - d. Make a rough draft
 - e. Make a comprehensive layout
 - f. Identify postal regulations
 - g. Make a folder dummy
2. Typography
 - a. Identify type fonts and styles
 - b. Identify type size
3. Design Principles
 - a. Identify methods used to achieve emphasis
 - b. Identify types of balance
 - c. Distinguish between good and poor shape harmony
 - d. Identify the elements of a printer's color wheel
 - e. Identify methods used to achieve rhythm

IV. Electronic Imaging Composition (PageMaker, Quark Xpress, Microsoft Office, AppleWorks)

A. Identify formats of type composition

1. Formats
 - a. Set justified copy
 - b. Set flush left copy
 - c. Set flush right copy
 - d. Set copy with tabular columns

- B. Use computer software for typesetting
 - 1. Typesetting procedures
 - a. Set copy with dot leaders
 - b. Set copy with base line rule
 - c. Set copy with cut-off rule
 - d. Set copy with mixed faces
 - e. Set copy with hanging indentation
 - f. Set copy with a run around
- C. Proofreading corrections
 - 1. Spell check
 - 2. Proper grammatical forms
- D. Page layout
 - 1. Calculate copy parameters
 - 2. Format a page layout
- E. Scanning operations
 - 1. Set up a scanner for operation
 - 2. Scan a line art illustration
 - 3. Scan a photograph
 - 4. Produce a halftone print
- F. Graphics
 - 1. Import a graphic illustration form a file
 - 2. Create a graphic illustration in a program
 - 3. Export a graphic illustration from a program
 - 4. Alter a file illustration
- G. Storage
 - 1. Initialize a floppy disk, CD, DVD
 - 2. Store a file on a floppy disk, CD DVD
 - 3. Store a file on a hard drive and file server
 - 4. Transfer a file from a hard drive or file server to a CD
 - 5. Transfer a file from CD/DVD to a hard drive
 - 6. Copy files
- H. Electronic Imaging
 - 1. Create a single color camera ready job
 - 2. Imposition
 - 3. Create a 2-color camera ready job using electronic trapping
 - 4. 4-color process

V. Digital Photography

- A. Camera types
 - 1. Set format
 - 2. Set resolution
 - 3. Set picture effect
- B. Picture storage
 - 1. Store on floppy disk
 - 2. Store on memory stick

3. Transfer photo to file on hard drive or file serve

VI. Image Assembly/Plate making

A. Stripping procedures

1. Strip 8 ½ X 11 – Pre-ruled masking sheet
 - a. Strip a flat, right reading
2. Draw lines on unruled masking sheet for 8 ½ X 11
 - a. Strip a flat, wrong reading
3. Stripping negatives on unruled and ruled masks
4. Multi-flat masking
 - a. Strip for combination or surprinting
 - b. Strip complimentary flats for multi-color printing
 - c. Strip signature flats for multi-page printing
 - d. Use the pin register system in stripping for a 2-color job

B. Plate Preparation

1. Prepare a subtractive plate
2. Prepare a digital plate

C. Plate exposure calibration

1. Use plate exposure unit
2. Maintain a plate exposure
3. Determine appropriate plate exposure
4. Make corrections on a plate
5. Use pin board for step-and-repeat plate exposure
6. Expose for a screen tint
7. Make plates for a two color job
8. Expose a photo direct plate

D. Plate developing

1. Develop an exposed plate

VII. Basic Offset Press

A. Main press systems

1. Identify the feed system
2. Identify the delivery system
3. Identify the ink system
4. Identify the water system
5. Setup systems on the press

B. Press preparation

1. Mix fountain solution using fountain testing equipment
2. Identify pressure checks on the press
3. Install blanket, plate, molleton covers
4. Identify chemicals used for the offset press
5. Identify inks used for printing
6. Set up the sheet control system

7. Set up the image control system
- C. Offset presswork
 1. Produce single color impression
 2. Produce multi-color (spot color) impression
 3. Demonstrate work and turn
 4. Demonstrate work and tumble
 5. Wash up the offset press
- D. Maintenance
 1. Determine lubrication requirements for a specific process
 2. Set up a preventative maintenance schedule in chart form
 3. Adjust dampening rollers to plate cylinder
 4. Adjust ink form rollers to blanket cylinder
 5. Adjust plate cylinder to blanket cylinder
 6. Degrease plate and impression cylinder
 7. Deglaze ink rollers and blanket
 8. Change blanket

VIII. Bindery

- A. Jogger
 1. Demonstrate paper handling
 2. Demonstrate the use of a jogger
- B. Operation of a drill
 1. Drill paper stock for a 3-ring binder
- C. Operation of hydraulic paper cutter
 1. List safety rules in operation a power paper cutter
 2. Use formula for cutting paper stock
 3. Use formula to determine number of sheets required for a specific job
 4. Make a combination cut using stock cutting formula
 5. Draw a cutting diagram
 6. Use a power paper cutter
 7. Maintain a power paper cutter
- D. Operation of finding machine
 1. Set-up a folding machine
 2. Use a folder to make the six major folds
- E. Operation of round cornering machine
 1. Set and operate for assigned size stock
- F. Methods of binding
 1. Operate a binding punch
 2. Operate a flat stitcher
 3. Operate a saddle stitcher
 4. Demonstrate wrapping and storage
- G. Packaging of printed materials
 1. Demonstrate wrapping and storage

IX. Paper

- A. Properties of Paper
 - 1. Select paper stock for assigned job
- B. Types of Paper
 - 1. Identify the basic types of paper
 - 2. Identify the basic weight
 - 3. Select equivalent weights of paper
- C. Printing Requirements
 - 1. Determine the most economical cut of stock
 - 2. Determine allowed for spoilage
- D. Trouble Shooting
- E. Paper Handling and Safety

X. Production Review

- A. Estimating
 - 1. Estimate costs of school print jobs
 - 2. Estimate costs of commercial shop printing jobs
- B. Quality Review
 - 1. Apply quality criteria to a completed print job

XI. Screen Printing

- A. Screen Material
 - 1. Determine between two basic types of screen mesh
 - 2. Distinguish size of screen mesh (opening size)
 - 3. Show stretching of screen mesh on frame
- B. Block-out Material
 - 1. Use hand cut paper and film
 - 2. Use light sensitive emulsion
- C. Inks
 - 1. Distinguish difference between water-based and oil-based inks & solvents
 - 2. Distinguish between air-set and heat-set inks
- D. Alignment
 - 1. Show centering of image on screen frame
 - 2. Show alignment of screens for registration of multi-color images

XII. Vinyl Cutting

- A. Vinyl Cutting Machine
 - 1. Demonstrate knowledge of machine's working parts
 - 2. Show how to load and release rolls of vinyl
 - 3. Distinguish difference between and application of sign and iron-on shirt vinyl
 - 4. Show how to replace a dull blade
- B. PrintCut Software
 - 1. Show use of basic drawing tools

2. Show how to import vectored graphics
3. Show how to align, center, and group different design components

C. Application

1. Distinguish difference between applying sign vinyl and shirt vinyl
2. Demonstrate weeding-out of sign vinyl and use of transfer tape
3. Demonstrate application of vinyl image to desired substrate
4. Demonstrate application of shirt vinyl with heat transfer machine

XIII. Sand Carving

A. Positives

1. Use a black Sharpie marker to draw image by hand
2. Use computer software to generate image
3. Use Imager to burn image on film and the Processor to develop film

B. Masking Materials

1. Demonstrate the use of sign vinyl for masking
2. Expose and wash-out image on light sensitive masking film

C. Mask Application

1. Demonstrate the application of mask adhesive to desired substrate
2. Show how film mask is applied to substrate over dried adhesive
3. Demonstrate how to remove air bubbles from applied film mask
4. Show how to apply vinyl tape to rest of project to protect it during blasting

D. Sandblasting

1. Show the major components of the sandblasting equipment
2. Show the proper settings of air valves and corresponding air pressure
3. Demonstrate the proper technique used to sand carve
4. Show how to recycle the sand
5. Show how to remove masking material and clean up project

Graphic Arts Project Descriptions

Final Project: Portfolio

Objective: Create a portfolio containing projects or examples of projects by the individual student for the school year. Digital photos will be taken of the projects that are not produced on paper. A power point presentation containing all projects will be an on-going assignment throughout the year and will be presented to the class at the end of the school year.

Software: Microsoft Office

Equipment: Ibico bindery machine or equivalent

Projects using Adobe Illustrator – All projects printed out on color laser or ink jet printer.

Project: Outline and Rasterize

Objective: Learn basic difference between vector and pixilated artwork.

Project: Disassembling Vector Artwork

Objective: Learn how clip art is drawn and how to take it apart to be edited. The concept is to see how a professional finished piece is created and work backward to learn the various techniques.

Project: Creating Basic Shapes

Objective: Use of Illustrator Tutorial to learn use of a few basic program tools. This is also another way students will have to learn, by reading and following directions.

Materials: Adobe Illustrator Tutorial Version 8

Project: Lines, Curves, and Maze

Objective: First step in learning how to use the pen tool. The most common tool in Illustrator, also used in Photo shop and Printcut.

Project: Nike Logo

Objective: Use freehand ability with pen tool to draw a Nike swoosh. Learn where to place anchor points and bend straight lines.

Project: Notepads

Objective: Complete an offset printing project from design through printing on the offset press and binding the finished notepads.

Equipment: Process Camera, Light Table, Offset Press

Project: Halloween, Christmas, and Valentine Cards

Objective: Learn how to lay out a job 2-up with trim marks using Photo shop and Illustrator.

Equipment: Paper cutter and 10 pt stock

Project: Playing Cards
Objective: Learn a more complex layout using trim marks, bleeds, and 2 sides. Combining the use of Photo shop and Illustrator.
Equipment: Paper Cutter and 10 pt stock

Project: Logo Color Break
Objective: Learn the difference between spot color and process colors and how to create artwork so it will separate into spot colors.
Equipment: Process Camera, Imager, Offset Press, Platemaker, Negatives, Masking Sheets, Metal Plates, 250 – No. 10 Envelopes

Project: Business Portfolio
Objective: Design a business card, letterhead, and envelope for a fictional company.

Project: Rubber Stamp
Objective: Learn the techniques and steps involved in making a rubber stamp.
Equipment: Polly Stamp Exposure Unit, Process Camera, Imagesetter

Project: Homecoming and Christmas Buttons
Objective: Design, print, and assemble a finished button for given event.
Equipment: Button Machine with assembly components

Project: Tri-fold Menu
Objective: Plan and design a menu for a fictitious “theme” restaurant. Menu will be printed back-to-back on tabloid size paper (11”X17”) and then laminated.
Equipment: Laminating machine, tabloid size laminate

Project: Grief Brochure
Objective: Design and create a 2-sided brochure on legal size paper stock using Pagemaker or Quark Xpress software.

Projects using Adobe Photo shop – All projects printed out on color laser or ink jet printer.

Project: Working with Selections
Objective: Learn different techniques to select objects. One of the most common tasks used in Photo shop.

Project: Layer Basics
Objective: Understand how Photo shop and other graphic programs build artwork.

Project: Painting/Editing
Objective: Learn different brush/painting techniques to design projects.

- Project:** Five Tools
Objective: Be creative using at least five different Photo shop tools and explain how each tool is used.
- Project:** Self Poster and/or Wanted Poster
Objective: Use digital camera to download a picture and learn techniques to enlarge and print the photo on 11X17 paper. Learn resolution issues associated with digital camera, photoshop, and color printers.
- Project:** Quick Mask
Objective: Learn the selection of objects using the quickmask mode.
- Project:** Dress Up Layers
Objective: Learn how Photo shop handles different layers and the different options that can be implemented.
- Project:** Clone Out
Objective: Using the rubber stamp tool, learn different techniques on removing an object and blending in the background.
- Project:** Hybrid Grudent (GRAphic arts stUDENT)
Objective: Use learned photoshop techniques to combine some of a classmate's facial features with your own to create a new student.
- Project:** Neanderthal Person
Objective: Use learned photoshop techniques to alter your own profile to resemble a neanderthal person with a bigger brow, extended nose and mouth, and smaller chin.
- Project:** Trading Card
Objective: Design a 3"X5" trading card featuring yourself with statistical categories on the reverse side.
Equipment: Laminating Machine

Screen Printing Projects

- Project:** Design and Print a Mouse Pad
Objective: Learn screen printing techniques and how to print computer files to an imagesetter using Illustrator and/or Photo shop.
Equipment: Imagesetter, Negatives, Screen Frames, Hi-fi material, mouse pad
- Project:** Design and Print a T-shirt
Objective: Use vectored images in combination with hand cutting techniques to produce a design on lacquer based screen printing film.
Equipment: Plastisol ink, T-shirt, basic Screen printing equipment

Sand Carved Projects

Project: Mugs

Objective: Create and apply a design to a ceramic mug using a photo resist or vinyl mask to protect the non-image area during sand blasting.

Equipment: Positives, Photo resist film, Vinyl cutting machine, and Sand blaster

Project: Mirror on a Wooden Plaque

Objective: Design and sand carve a design on the front and back of a mirror. The image on back cuts through the silvering on back of mirror and can be painted a color, which shows up on the frontside. The front image has a frosted glass appearance. Finished mirror is mounted on wooden plaque with double sided foam tape.

Equipment: 4"X6" Brick Mirrors, Vinyl cutter, Photo resist film, Sand blaster, 6"X8" Wooden Plaques (fabricated in production lab)

Vinyl Projects

Project: Small Vinyl Signage

Objective: Produce a small vinyl sign (12"X12") containing text and at least one graphic. Graphics and lettering should be designed in the Printcut software so imagery is vectored.

Equipment: Vinyl Cutter, Rolled Vinyl, Transfer Tape

Project: Iron-On Vinyl T-shirt

Objective: Design and apply a vinyl image on a T-shirt. Image area is 12"X12" and must contain text with at least one graphic. The Printcut software must be used, as all imagery has to be vectored.

Equipment: Vinyl Cutter, Iron-On Vinyl, Heat Press Machine

Recommended Resources

Textbooks/References

Photo Offset Fundamental, Cogoli

Graphic Communications, Prust

Graphic Arts, Mid-America Voc. Curric. Consortium

PIA Print Ed Certification, Printing Industries of America

Kodak Bulletins, Kodak

MacIntosh reference manual, Apple Computers

Pagemaker, reference manual, Aldus Corp.

QuarkXpress, Quark, Inc.