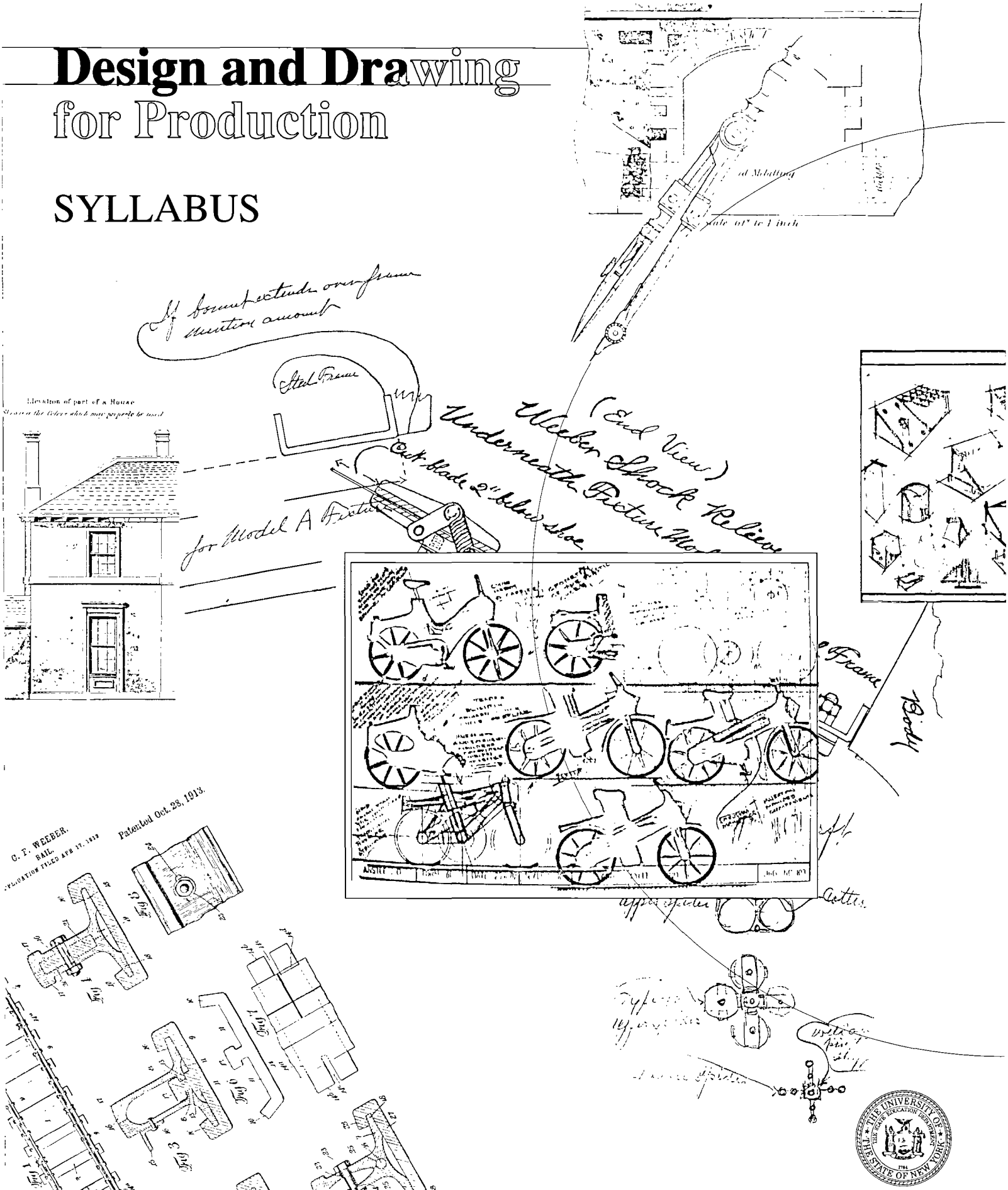
Design and Drawing for Production

SYLLABUS



The University of the State of New York
The State Education Department
Albany, NY 12234
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Assistant Commissioner for Curriculum, Instruction and Assessment

Spring, 2000

To: Persons with Responsibility for Implementing *Design and Drawing for Production*

From: Roseanne DeFabio, Assistant Commissioner

This syllabus, *Design and Drawing for Production* (DDP) has been widely used by students throughout New York State as an introductory course to the design process. In earlier editions this document was used as a guide to help students achieve the Regents goals and Commissioners Regulations in both visual arts and occupational education.

With the adoption of the Learning Standards by the Regents, this syllabus plays an important role towards meeting these standards as well. This course provides opportunities in the areas of design and drawing through creative thinking, decision-making and problem-solving experiences. These transferable skills play an important role in helping students achieve the higher standards expected of them. Strategies of design and drawing appropriate now and in the future are emphasized. Although there are tremendous changes taking place in the design area pertaining to the use of computers, this course should provide students with an opportunity to express themselves and display their talents in a variety of ways. Content of the course should drive instruction, not the computer. A shift from the conventional learning methods to this design problem approach is the basis for this syllabus.

The *Design and Drawing for Production* syllabus may be used to provide instruction to any student to satisfy the commencement level Art/Music requirement. Either Art Education or Technology Education teachers can provide instruction. It may be used as part of the Technology Education curriculum or as part of the Art Education curriculum.

Students pursuing an approved Technology Education sequence will receive Technology Education credit while also satisfying the commencement level Art/Music requirement. All students not pursuing an approved Technology Education sequence will earn credit in Art Education while also satisfying the commencement level Art/Music requirement. To fulfill this requirement, the course of study must utilize the State developed DDP syllabus. Courses of study such as Computer Aided Design (CAD) or Introduction to Engineering Design (IED) may not be substituted for DDP, and do not fulfill the Art/Music unit requirement.

For questions or comments regarding this syllabus, please contact either:

Roger Hyndman
Associate in Art Education
New York State Education Department
681 EBA
Albany, NY 12234
(518) 472-5922

Eric Suhr
Associate in Technology Education
New York State Education Department
671 EBA
Albany, NY 12234
(518) 486-3659

Addendum To
Design and Drawing for Production (DDP) Syllabus when used to satisfy the Art/Music Credit Requirement

The course, Design and Drawing for Production may be used by any student to satisfy the Art/Music credit requirement if the following criteria are met.

- Addresses aspects of both the Visual Arts* and Technology standards
- Be commencement level in content and focus
- A full year course for use in this requirement
- Taught by a certified Art or Technology teacher or team taught
- Content focused on critical thinking and creative problem solving skills using the design process
- Computers may be introduced as a tool of the process but not driving delivery of the content
- Available for use by students in an Art or Technology sequence
- The existing State developed syllabus, *Design and Drawing for Production* should be used as a starting framework for instructional approach and context

*All four of the Arts Standards for Visual Arts under the General Education heading at the commencement level must be incorporated and documented to satisfy this requirement. A matrix indicating where the appropriate standard(s) should be addressed is listed below for clarification. The Technology standard key ideas are also referenced to facilitate alignment and context for instruction.

DDP Constants	**Visual Arts Standards Addressed** (Numbers refer to standard)	**Technology Standard 5 Key Ideas Addressed** (Numbers refer to Key Idea)
Drawing Area	**1**	**1, 2, 3**
Design Activity	**1, 2**	**1,2,3,4,5,6,7**
Research and Critical Analysis	**1, 3, 4**	**1,2,7**
Historical Reference	**1, 2, 4**	**5**
Skills	**1, 2**	**1,2,6**
Linkage	**2, 3**	**2,4,6**
Evaluation	**1, 2, 3, 4**	**1,2,6,7**

(3/00)

Some examples of student activities that address the standards within the constants of the Design and Drawing for Production syllabus follow. Districts are encouraged to develop a variety of different examples to demonstrate student achievement of the standards.

Student Task Examples

DDP Constant- Design Activity
Specific criteria for the successful design and drawing requires a statement, offering guidance for the problem solver as well as considerations toward evaluation.

Visual Arts Std. 1, 2, Technology Std. 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7

- Students select a process or medium for their intended work of art and describe their reasons for that selection.
- Students select appropriate tools, materials and processes to manufacture a product (chosen on the basis of market research) that appeals to high school students.

DDP Constant- Research and Critical Analysis
Analysis of the problem and its ramifications towards environmental, societal and cultural impacts.

Visual Arts Std. 1, 3, 4, Technology Std. 5.1, 5.2, 5.7

- Students select a style of art from the 20th century, study the characteristics of that style, research one artist who painted in that style and make a work of art using that style but expressing the students' point of view or idea.
- Students search the internet for web sites dealing with renewable energy and sustainable living and research the development and design of an energy efficient home.
- Students organize and implement an innovative project, based on market research, that involves design, production, testing, marketing, and sales of a product or a service.

DDP Constant- Historical Reference
Historical precedents and futuring must be mentioned in lecture, discussion or activities.

Visual Arts Std. 1, 2, 4, Technology Std. 5.5

- Students develop an idea for a work of art, research the various ways in which the idea has been expressed by the artists and at other times, select the appropriate medium or technique for that work and complete the work.
- Students compare qualitatively and quantitatively the performance of a contemporary manufactured product, such as a household appliance, to the comparable device or system 50-100 years ago, and present results graphically, orally and in writing.

DDP Constant- Skills
Competency in the conventions of drawing would cover the skills required to express one's ideas visually. Drawing conventions, uses of materials and professional conduct are also stressed.

Visual Arts Std. 1, 2, Technology Std. 5.1, 5.2, 5.6

- Students use one medium or technique in more than two works to indicate their skill with that medium or technique.
- Students produce a computer-generated design in which they use their understanding of composition, color, line, space.

- Students design and model a portable emergency shelter for a homeless person that could be carried by one person and be heated by the body heat of that person to a life-sustaining temperature when the outside temperature is 20°F.
- Students use a range of high- tech composite or synthetic materials to make a model of a product and explain their choice of material.

DDP Constant- Drawing Area

The six major technical drawing areas; Orthographic, Pictorial, Sections, Auxiliaries, Revolutions, Transitions and Developments.

Visual Arts Std. 1, Technology Std. 5.1, 5.2, 5.3

- Students develop an idea for a work of art, research the various ways in which the idea has been expressed by the artists and at other times, select the appropriate medium or technique for that work and complete the work.
- Students develop plans, diagrams and working drawings for the construction of a computer-controlled marble sorting system that simulates how parts on an assembly line are sorted by color.

DDP Constant- Linkage

Application of the design to the real world by linking to mass production methods is essential. The factors of the various resources, ecological and environmental impacts are considered.

Visual Arts Std. 2, 3, Technology Std. 5.2, 5.4, 5.6

- Students interview a professional artist about what that artist does, his/her preparation, the organization of his/her business.
- Students discuss the point of view of a critic in a local newspaper who has reviewed a local exhibition.
- Students describe how the flow, processing and monitoring of materials is controlled in a manufacturing plant and information-processing systems provide inventory, tracking and quality control data.
- Students identify new or emerging technologies and use a futuring technique to predict what might be the second and third order impacts.

DDP Constant- Evaluation

Criteria specific to the quality of the design solution as well as use of materials and technique are to be evaluated along with the appropriate standards areas.

Visual Arts Std. 1, 2, 3, 4, Technology Std. 5.1, 5.2, 5.6, 5.7

- Students write a review of a student exhibition.
- Students analyze the way in which a work of art by Leon Golub expresses a political point of view.
- Students design a procedure to test the properties of synthetic and composite materials.
- Students draw a labeled system diagram which explains the performance of a system, and includes several subsystems and multiple feedback loops.

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Regents of The University

CARL T. HAYDEN, *Chancellor,* A.B., J.D. ..... Elmira
DIANE O'NEILL MCGIVERN, *Vice Chancellor,* B.S.N., M.A., Ph.D. ..... Staten Island
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SAUL B. COHEN, B.A., M.A., Ph.D. ..... New Rochelle
JAMES C. DAWSON, A.A., B.A., M.S., Ph.D. ..... Peru
ROBERT M. BENNETT, B.A., M.S. ..... Tonawanda
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ENA L. FARLEY, B.A., M.A., Ph.D. ..... Brockport
GERALDINE D. CHAPEY, B.A., M.A., Ed.D. ..... Belle Harbor
RICARDO E. OQUENDO, B.A., J.D. ..... Bronx
ELEANOR P. BARTLETT, B.A., M.A. ..... Albany
ARNOLD B. GARDNER, B.A., LL.B. ..... Buffalo

President of The University and Commissioner of Education
RICHARD P. MILLS

Chief Operating Officer
RICHARD H. CATE

Deputy Commissioner for Elementary, Middle, Secondary, and Continuing Education
JAMES A. KADAMUS

Assistant Commissioner for Curriculum, Instruction, and Assessment
ROSEANNE DEFABIO

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Design & Drawing for Production

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THE STATE EDUCATION DEPARTMENT
Albany, New York 12234

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FOREWORD

I. PURPOSE

Design and Drawing for Production has been developed as a response to the Regents Action Plan to improve the quality of education in New York State. It is intended to meet the requirements established primarily in the Regents Action Plan Goal Three which is concerned with Visual Arts and Part 100 of the Commissioner's Regulations and Occupational Education Policies.

This syllabus is intended to be implemented through a two-semester course as an introduction to a universal graphic language through which students can express their ideas with creativity, clarity, and exactness.

II. AUDIENCE

The syllabus assists Art Education and Technology Education Teachers in providing instruction in order for each student to achieve the stated outcomes. *Design and Drawing for Production* can be used to provide instruction to any high school student. It is an integral component of the State approved Technology Education sequence and also serves as a prerequisite for advanced elective courses in Art Education. Successful completion satisfies the high school Art/Music requirement.

III. DEVELOPMENT

The original manuscript and field test editions were coordinated under the guidance of members of three bureaus in the New York State Education Department: Roger E. Hyndman, Associate in Art Education, Bureau of Arts, Music and Humanities Education; Herbert M. Ranney, Associate in Technology Education, Bureau of Home Economics and Technology Education; and Barbara J. Piwnica, ESC Specialist, Bureau of Curriculum Development.

The original manuscript was written by the Project Coordinator, Richard L. Shadrin, Director of the Department of Visual Arts, Newburgh Enlarged City School District; Thomas F. Bryant, Art Education Teacher, Jericho High School; Richard Butler, Registered Architect, Clifton Park; Bryna Eill, Art Education Teacher, LaGuardia High School; David R. McAnaney, Art Education Teacher, Half Hollow Hills High School East; and Gretchen Marcell, Art Education Teacher, Stillwater Central School.

The original manuscript was then further developed, revised and edited to become a field test syllabus. This was accomplished by: Donald Beusman, Technology Education Teacher, Churchville-Chili Senior High School; Bruce E. Chapin, Art Education Teacher, Valley Central High School; Allen Craft, Technology Education Teacher, Scotia-Glenville High School; L. David Levinson, Art Education Teacher, Newburgh Free Academy; David R. McAnaney, Art Education Teacher, Half Hollow Hills High School East; Jacqueline N. O'Malley, Art Education Teacher, Newburgh Free Academy; Richard L. Shadrin, Director of the Department of Visual Arts, Newburgh Enlarged City School District; Constance Smith, Art Education Teacher, Lynbrook South Middle School; and Stuart Soman, Technology Education Teacher, West Hempstead Middle-Sr. High School.

The draft syllabus was then field tested by the following teachers during the 1987-88 academic year:

Albany High School
700 Washington Avenue
Albany, NY 12203
Philip Gunther

Brentwood High School
Sonderling Center
Brentwood, NY 11717
Thomas N. Tagle

Canarsie High School
1600 Rockaway Parkway
Brooklyn, NY 11236
Myron Rock

Carmel High School
30 Fair Street
Carmel, NY 10512
John Roger

Charlotte Jr.-Sr. High School
4115 Lake Avenue
Rochester, NY 14612
Michael Cavagnaro

Churchville-Chili Sr. High School
5786 Buffalo Road
Churchville, NY 14428
Don Beusman
Louis Ianni

Commack High School North
Scholar Lane
Commack, NY 11725
Richard Hoffman

East Islip High School
Redmond Street
Islip Terrace, NY 11752
William Melendez

FD Roosevelt Sr. High School
South Cross Road
Hyde Park, NY 12538
John Quimby

Franklin K. Lane High School
999 Jamaica Avenue
Brooklyn, NY 11208
Mary Shira

Half Hollow Hills High School East
50 Vanderbilt Parkway
Dix Hills, NY 11746
David McAnaney

Herbert H. Lehman High School
3000 E. Tremont Avenue
Bronx, NY 10461
Edward Nusser

Jericho Union Free High School
Cedar Swamp Road
Jericho, NY 11753
Thomas Bryant

John Adams High School
101-01 Rockaway Blvd.
Ozone Park, NY 11417
Joseph Cappello
Brian Withers

John Dewey High School
50 Avenue X
Brooklyn, NY 11223
Ivan Rubin

John F. Kennedy High School
99 Terrace View Avenue
Bronx, NY 10463
William Freeman

Lafayette High School
370 Lafayette Avenue
Buffalo, NY 14213
Vincent Scamacca

Lincoln High School
Kneeland Avenue
Yonkers, NY 10704
Mckram Yacoub

Lynbrook High School
Union Avenue
Lynbrook, NY 11563
Thomas Lamond

Manhattan Center for Science and Mathematics
116th St. & FDR Drive
New York, NY 10029
Jeffrey Levin

Newburgh Free Academy
201 Fullerton Avenue
Newburgh, NY 12550
Bruce Haase

New Dorp High School
465 New Dorp Lane
Staten Island, NY 10306
Dorothy Gutman

North Junior High School
301 Robinson Avenue
Newburgh, NY 12550
John Eng

Northport Sr. High School
Laurel Hill Road
Northport, NY 11768
John Heron

North Tonawanda Sr. High School
405 Meadow Drive
North Tonawanda, NY 14120
Robert E. Bemisderfer

Park West High School
525 W. 50th Street
New York, NY 10019
Fred Leyboldt

Sachem High School, South Campus
51 South Street
Lake Ronkonkoma, NY 11779
James DeWire

Scotia-Glenville High School
Sacandaga Road
Scotia, NY 12302
Allen Craft

South Junior High School
33-63 Monument Street
Newburgh, NY 12550
Robert Zapf

Stillwater Central School
North Hudson Avenue
Stillwater, NY 12170
Gretchen Marcell

Tappan Zee High School
Dutch Hill Road
Orangeburg, NY 10962
Harold Bromm

Tottenville High School
100 Luten Avenue
Staten Island, NY 10312
Louis Greenzweig

Union-Endicott High School
1200 E. Main Street
Endicott, NY 13760
Orazio Salati

Valley Central Sr. High School
63-75 Rte. 17K East
Montgomery, NY 12549
Bruce Chapin

Wallkill Senior High School
Wallkill, NY 12589
Charles Van Alst

West Hempstead Middle-Sr. High School
400-450 Nassau Blvd.
West Hempstead, NY 11552
Stuart Soman

Staff from the Office for the Education of Children with Handicapping Conditions (State Education Department) reviewed this syllabus regarding the needs of students with handicapping conditions. Karl S. Wittman, Office of the Administrator-Division of Civil Rights and Intercultural Relations (State Education Department), reviewed this syllabus regarding equity issues. Sylvia K. Corwin, John F. Kennedy High School, and Judy Isacoff Thomas, Naturalist Educator, Box 342, Pomona, New York, performed reviews regarding environmental issues.

A review committee comprised of Don Beusman, Bruce Chapin, Louis Greenzweig, Richard Hoffman, Gretchen Marcell, and David McAnaney met in January 1988. They met, along with the State bureaus coordinating this project, to review all of the feedback submitted after the fall semester. Recommendations for revisions were provided. A Field Test Edition II Syllabus was then developed at the Education Department.

The Field Test Edition II Syllabus was reviewed by the following professionals: Peter S. Pawlik, Coordinator of the Engineering Technology Program, The State University College at Buffalo; James Stewart, Professor in the Technology Program, The State University College at Buffalo; and Dr. Carlton Salvagin, Professor in the Technology Program, The State University of New York at Oswego.

This final *Syllabus* was prepared under the direction of Roger E. Hyndman, Associate in Art Education, Bureau of Arts, Music and Humanities Education, and Herbert M. Ranney, Associate in Technology Education. Mary Theresa Southworth, ESC Specialist, Bureau of Curriculum Development, served as Project Manager. Staff from the Office for the Education of Children with Handicapping Conditions reviewed the manuscript in light of the needs of students with handicapping conditions. Michael Moon, Associate in the Division of Civil Rights and Intercultural Relations, reviewed the manuscript for equity concerns.

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INTRODUCTION

SYLLABUS GOAL:

The ultimate goal to be achieved when providing instruction through using *Design and Drawing for Production* is to equip each student with the necessary knowledge and skills needed to reach full potential as a human being. This syllabus provides experiences for the student to function as a more skillful and knowledgeable citizen in society in relationship to employment, community, environment, family, and self.

SYLLABUS RATIONALE:

Design and Drawing for Production, formerly entitled *Mechanical Drawing and Design*, encourages visual problem-solving using a common graphic language to describe forms in the human-made environment. To enable the student to analyze, creatively design, and critically evaluate these forms, the syllabus requires researching for historical precedents, cultural references, environmental impact, and future vision.

This syllabus is an attempt to deviate from the conventional learning methods and application of skills through a follow-up exercise to a more exciting design problem approach. It provides experiences for the student to be given a design problem and present a solution through design and drawing exercises.

This type of approach is the vehicle for worldwide industrial communication and an integral step in the process toward product design and production. Other simulation techniques such as model building help develop an ability to analyze and demonstrate an understanding of three-dimensional forms in space. Application of these design and drawing activities and simulation techniques ultimately result in the manufacturing of products, design of transportation systems, the integration of communication and the construction of buildings.

SYLLABUS CONTENT:

The style of presentation for this syllabus evolved from the way industrial, engineering, and architectural firms solve their design problems and communicate their solution(s). The syllabus emphasizes critical thinking, creative problem-solving and the decision-making processes by requiring the student to examine past solutions, learn technical drawing processes, experience design techniques and become critically active in evaluating both personal work and work by others.

Starting with the presentation of a Design Activity Brief, teachers are provided with descriptive information in each of the following seven constants:

- Technical Drawing Area
- Design Activity
- Research and Critical Analysis
- Historical References
- Skills
- Linkage
- Evaluation.

This descriptive information should be the basis for the development of any Design Activity Brief.

The seven constants are organized in a holistic manner. Teachers may begin from any one and continue in any order. To complete a Design Activity Brief, all seven constants are to be investigated.

A more detailed explanation of each constant is provided on the Typical Example pages in chart form beginning with page 13. Samples of how to provide learning experiences using a Design Activity Brief are provided in the Strategies for Instruction section beginning on page 4.

Through exercises developed within Design Activity Briefs, the students are provided with opportunities to experience critical thinking, problem-solving and decision-making. They will also be able to acquire technical drawing skills and experience design techniques.

The Statement of Regents Goals is then presented. Following are the subgoals and objectives pertinent to student achievement in a course where instruction is received through the use of this syllabus.

A Scope and Sequence of using this syllabus in a 40-week, two-semester course is provided.

Evaluation Strategies provide both formative and summative suggestions for evaluating both the information provided in this syllabus as well as student progress and achievement.

The Design/Production Process section provides the teacher with steps a project goes through in industry, beginning with a need and ending with production. The teacher parallels the experiences of a Design Activity Brief to this real life process in order for the student to understand and relate the exercises to real life processes.

The Design Activity Brief and the charts are of parallel construction. First, in chart form, the teacher is provided with detailed information regarding the constants. Then, also in chart form, more extensive information on each constant is provided on the Typical Example pages. As each constant is explained, it is highlighted by a white column with its pertinent information in the rectangular box below.

Following these Typical Example pages are **SAMPLE DESIGN ACTIVITY BRIEFS**. They provide examples for all six technical drawing areas which are to be covered during the 40 week, two-semester course. They are just samples and you are encouraged to develop your own.

For suggestions of sources of information to supplement your classroom and school library, consult the Selected Bibliography.

Teachers may refer to the following appendices for further information. Appendix A provides information concerning computer usage. Appendix B lists materials and supplies which may be used. Appendix C lists potential health risks in a classroom typically used by the students involved in the implementation of this syllabus. Appendix D mentions considerations for students with handicapping conditions. Appendix E mentions considerations for educating the gifted student. Appendix F provides information pertinent to the credit given to a student receiving instruction through this syllabus with

regard to the Visual Arts Education or Technology Education Sequences. Appendices G, H and I provide information to the teacher as to where a course implementing this syllabus fits into the Visual Arts Education and Technology Education sequences. Appendix K lists additional ideas or suggestions for other possible Design Activity Briefs.

SYLLABUS USAGE:

The success of a course implementing this syllabus depends largely on the creativity, ambitions and initiative of the teacher, in creating an atmosphere of excitement and qualitative instructional experiences.

After carefully reading the entire syllabus, refer again to the **Scope and Sequence** (p. 10) to become familiar with the six technical drawing areas to be covered in the two-semester course. Then refer to the initial **Design Activity Brief** (p. 5) and the **Typical Example** pages (pp. 13-22) to get a more specific idea as to how to cover the technical drawing areas by providing design and drawing experiences to your students.

Always refer to the **Design/Production Process** (p. 12) and parallel it with the **Design Activity Brief** in progress. This will allow for student knowledge and awareness of his/her experiences pertinent to the real life processes experienced throughout engineering, industrial and architectural firms.

STRATEGIES FOR INSTRUCTION

Refer to the **SAMPLE DESIGN ACTIVITY BRIEFS** section (pp. 23-39) to view specific exercises providing the student with experiences in one or more technical drawing areas. A blank form is available for your use when developing your Design Activity Brief.

To successfully utilize *Design and Drawing for Production*, the teacher should:

1. Emphasize that creative problem-solving is the essence of good design, stressing that design is the creative element and technical drawing is the expression of design. The best designs turn disadvantages into aesthetic and functional advantages. The best drawings result from the application of the appropriate methodology and skillful manipulation of tools. Brainstorming and critical thinking activities can encourage this type of understanding.

2. Use a combination of conceptual, critical, quantitative and rational thinking modes in the design-solving process. This includes a special emphasis on visual and spatial relationships as a skill that is teachable and necessary for quality work.

3. Encourage an interaction with the 'real world' by using field study, resource material from the design professions such as journals, texts, periodicals; guest lectures by practioners, as well as the tools professionals employ to save time and promote quality. The form and function of natural objects could be examined.

4. Introduce computer assisted design and drawing to the student and integrate it in design activity brief experiences.

5. Challenge the student to take risks in design solutions.

6. Include prevocational skills to prepare the student for employment as well as collegiate study.

7. Insist that careers in this discipline require the student to learn precision, personal responsibility and that this type of design and drawing should be achieved with an economy of means.

8. Assist teachers at the elementary level in teaching design and technical drawing.

9. Recognize the duality of the program that exists in this redesign: **THE DESIGN ACT AS A CREATIVE EXERCISE** and **THE DRAWING ACTIVITY AS COMMUNICATION.**

Choose one of the six major technical drawing areas to be covered this year. Subgroups, such as isometric, should appear in parenthesis.	TECHNICAL DRAWING AREA:
1. These statements should be made in narrative form, perhaps as a scenario or a situation describing a need to be fulfilled. 2. Specific criteria for the successful design and drawing should be stated, offering guidance for the problem solver as well as considerations toward evaluation. To avoid complex design solutions which involve drawing skills exceeding the capability or experience of the students, care should be exercised in selecting and stating the design problem. The design problem should be structured to focus on and achieve the limited number of objectives identified for the period of instructional time by the teacher. Lack of precision in specifying criteria in stating the design problem may create a need for considerable individual instruction evolving from misinterpretation. 3. Critical thinking and creative problem-solving skills need to be emphasized as important processes in this step.	DESIGN ACTIVITY:
The teacher and/or students should analyze the nature of the problem and its ramifications. Environmental, societal and cultural impacts need to be considered.	RESEARCH AND CRITICAL ANALYSIS:
Historical precedents and futuring must be revealed in lecture, discussion or additional activities. Visual aids, slides, video, models, media, other print materials, cultural institutions and community resources may be used when appropriate.	HISTORICAL REFERENCES:
Competency in the conventions of drawing would cover the skills required to express one's ideas visually. Drawing conventions, uses of materials and professional conduct are stressed to communicate ideas visually.	SKILLS:
The application of the design to the real world will be made by linkage to mass production methods, transportation or communication systems. The factors of cost, materials, method, labor, technology, processes, ecological and environmental impact are considerations. Information regarding pertinent careers should be provided.	LINKAGE:
STUDENT REQUIREMENTS & CRITERIA FOR EVALUATION:	
Criteria specific to the quality of the design solution are to be evaluated.	DESIGN:
Qualities relevant to the uses of materials, techniques, scale, etc... are to be evaluated.	DRAWING:

GOALS AND OBJECTIVES

The development of this syllabus resulted from the *Statement of Regents Goals for Elementary and Secondary School Students - 1984.*

STATEMENT OF REGENTS GOALS FOR ELEMENTARY AND SECONDARY SCHOOL STUDENTS - 1984

The Regents Statement of Goals for students includes skills and characteristics which each student should acquire through education. Responsibility for education is shared by the family, schools and other organizations in each community. The *Action Plan to Improve Elementary and Secondary Education Results in New York* focuses on the actions *schools* can and must take to help students meet these goals.

Our Action Plan is directed toward what children in New York should be, should know and should be able to do. Our expectations and standards set for them reflect an anticipation of the knowledge, skill and capacity they must have to meet ever more rigorous challenges for employment and economic competition; for carrying their obligations in the governance of our democratic republic; for meeting their responsibilities to family, self and community; and for the perpetuation of culture and civilization in New York.

The goals, expectations, and aspirations to be realized through the schools are the same for all. However, all children are not the same. They have different talents and abilities, interests and emotions, strengths and weaknesses. For each individual we desire an educational system that will both stimulate and urge the full development of potential. We must, therefore, provide considerable choice and flexibility for each student together with basic requirements. We want each child to develop self-confidence and a belief in the success in learning. We want each to develop a capacity for continued self-learning. We want each to develop self-discipline and a sense of decency and responsibility.

In order to put those objectives for self-development in the perspective of what is necessary for the individual to contribute to and succeed in society, we have the more general standards and credentials for all. These provide the societal guideposts to indicate what each child and what each child's school needs to prepare for taking part in a broader community.

The specific statements of goals that follow are all in terms of our expectations for students. They start with a first priority on language — the capacity to communicate which underpins all the rest of learning. These statements of goals are, in turn, translated in this Plan to courses, subjects, disciplines,and methods in inquiry for examining the world. Taken together the goals represent our judgments or choices for the meaning of a total elementary and secondary education.

1. Each student will master communication and computation skills as a foundation to:

   1.1 Think logically and creatively.

   1.2 Apply reasoning skills to issues and problems.

1.3 Comprehend written, spoken and visual presentations in various media.

1.4 Speak, listen to, read, and write clearly and effectively in English.

1.5 Perform basic mathematical calculations.

1.6 Speak, listen to, read, and write at least one language other than English.

1.7 Use current and developing technologies for academic and occupational pursuits.

1.8 Determine what information is needed for particular purposes and be able to acquire, organize and use that information for those purposes.

2. Each student will learn methods of inquiry and knowledge gained through the following disciplines and use the methods and knowledge in interdisciplinary applications:

2.1 English language and literature.

2.2 History and social science.

2.3 Mathematics.

2.4 Natural sciences and *technology*.

2.5 Language and literature in at least one language other than English.

3. Each student will acquire knowledge, understanding, and appreciation of the artistic, cultural, and intellectual accomplishments of civilization and develop the skills to express personal artistic talents. Areas include:

3.1 Ways to develop knowledge and appreciation of the arts.

3.2 Aesthetic judgments and the ability to apply them to works of art.

3.3 Ability to use cultural resources of museums, libraries, theaters, historic sites, and performing arts groups.

3.4 Ability to produce or perform works in at least one major art form.

3.5 Materials, media and history of major art forms.

3.6 Understanding of the diversity of cultural heritages.

4. Each student will acquire knowledge about political, economic, and social institutions and procedures in this country and other countries. Included are:

4.1 Knowledge of American political, economic, and social processes and policies at national, state, and local levels.

4.2 Knowledge of political, economic, and social institutions and procedures in various nations; ability to compare the operation of such institutions; and understanding of the international interdependence of political, economic, social, cultural and environmental systems.

5. Each student will respect and practice basic civic values and acquire the skills, knowledge, understanding, and attitudes necessary to participate in democratic self-government. Included are:

   5.1 Understanding and acceptance of the values of justice, honesty, self-discipline, due process, equality, and majority rule with respect for minority rights.

   5.2 Respect for self, others and property as integral to a self-governing, democratic society.

   5.3 Ability to apply reasoning skills and the process of democratic government to resolve societal problems and disputes.

6. Each student will develop the ability to understand and respect people of different race, sex, ability, cultural heritage, national origin, religion, and political, economic, and social background, and their values, beliefs and attitudes.

7. Each student will acquire knowledge of the ecological consequences of choices in the use of the environment and natural resources.

8. Each student will develop general career skills, attitudes, and work habits and make a self-assessment of career prospects.
   Students not directly pursuing postsecondary education will acquire entry-level employment skills.

9. Each student will learn knowledge, skills, and attitudes which enable development of:

   9.1 Self-esteem.

   9.2 The ability to maintain physical, mental, and emotional health.

   9.3 Understanding of the ill effects of alcohol, tobacco, and other drugs.

10. Each student will develop a commitment to lifetime learning with the capacity for undertaking new studies, synthesizing new knowledge and experience with the known, and refining the ability to judge.

This syllabus allows for the Regents Goals to be achieved either directly or indirectly through the exercises the student will experience. More specifically, *Design and Drawing for Production* allows for all six of the areas of Goal Three to be incorporated into its content.

SUBGOALS:

The following subgoals for a course implementing this syllabus have been established.

Through qualitative, effective art education and technology education, each student will:

- develop the knowledge, understanding and appreciation of the artistic, cultural, technological and intellectual accomplishments of civilization.
- develop design and drawing skills to express personal creative talents.
- develop consumer, personal, occupational and relationship skills to enhance his/her abilities to meet responsibilities in the home and workplace.

OBJECTIVES:

The following objectives have been developed as a framework for guidance regarding your instructional program and evaluation techniques. More specific objectives may be developed at the local level.

Through the implementation of this syllabus, the student will be able to:

1. solve design problems in a unique, vigorous and creative manner by conceptualizing and visualizing the use of systems which are sequential, logical and temporally ordered.

2. communicate graphically with accuracy and precision, timeliness and responsibility as a means of skills preparation for entry level employment.

3. experience a wide variety of problems demonstrating competence in traditional and contemporary methods, practices and technologies appropriate to industry and occupational areas.

4. evaluate the quality of man-made objects through the application of historical knowledge, technical description and aesthetic judgment.

5. demonstrate an understanding of the impact of environmental, sociologic and economic factors on design.

6. understand art as being bias free with respect to job marketability.

7. experience the introduction and integration of computer assisted design and drawing as a means of producing desired results.

SCOPE AND SEQUENCE

The usage of Design Activity Briefs to experience all six technical drawing areas provides challenge and excitement to the student. The syllabus is planned to provide one unit of credit and encompass two semesters of instructional time. For a student to receive full value and impact, enrollment is recommended for the complete one unit, two-semester course. This will allow for acquisition and application of minimum level conventions throughout the design and drawing experiences.

For one unit of credit the syllabus prescribes that the student will be able to communicate graphically with accuracy and precision using the specified conventions inherent in each of these six major technical drawing areas:

- Orthographic Projection
- Pictorial Drawings
- Sections
- Auxiliaries
- Revolutions
- Transitions and Developments

In the event that the individual school program must be planned to offer only one half unit of *Design and Drawing for Production*, instruction and application of the first two technical drawing areas (orthographic projection and pictorial drawings) must be provided. In addition, through instruction, the student should be exposed to and made aware of the other four technical drawing areas.

When implementing curriculum at the local school district level, remember that this course of study should be organized in a holistic manner. All seven constants of a Design Activity Brief are to be investigated. As mentioned before, the learning process may start from any constant and continue in any order.

There is no suggested sequence for covering the technical drawing areas. Even if the teacher intends to cover just one area there may be ramifications leading to the opportunity to experience others simultaneously.

The instructional time needs to be organized and budgeted in such a way to ensure that during the year student activity is scheduled to cover all six technical drawing areas adequately. Consequently, students will have the ability to demonstrate and utilize the basic concepts and conventions of technical drawing that would be expected at this age/grade level. Of equal importance, the student will know how to use reference books and materials to acquire more detailed information which may be needed.

The elements and principles of art are to be an integral part of the learning process. (See Appendix J) The Design Activity Brief is the mechanism to allow for coverage of the elements and principles of art in the Design Activity. Students should understand that the design process is the basis for visual organization, and a process common to the practice of fashioning images into forms for visual communication.

The six technical drawing areas are to be considered comparable to a tool chest. The teacher should cover each and focus on the minimum conventions inclusive of each, as needed. The Design Activity Brief is the mechanism to allow for coverage of the design and drawing process for each technical drawing area. Visual aids should be available in the classroom. These aids would serve as another resource for the student throughout the design and drawing experiences.

EVALUATION STRATEGIES

The following evaluation guidelines suggest ways that student progress toward the achievement of the course objectives can be assessed. The information below is suggestive of the possible categories and percentages that an instructor would use for the evaluation of students during each Design Activity Brief.

a.	Originality/Creativity of Design	35%
b.	Historical References	10%
c.	Research/Critical Analysis	20%
d.	Accuracy/Drawing Activity	35%

Some students with handicapping conditions may be unable to achieve the same competency of freehand sketching that they exhibit through Computer Assisted Design and Drawing or some other adapted design and drawing technique. **While these students must attain the same academic standards as their nonhandicapped peers, the individual needs and abilities of particular students should be carefully considered prior to the start of this course.** This will ensure that the teacher and students are aware of necessary modifications. See Appendix D for information on strategies for providing instruction to students with handicapping conditions.

FINAL EVALUATION

When determining a grade at the end of each semester and the final grade for the completion of the course of study, a portfolio of accumulated student work should be reviewed and factored into the final grade. The portfolio should consist of completed assignments and supporting documentation that demonstrates student understanding of the thirteen step *Design/Production* Process. The portfolio should account for approximately twenty-five percent of the student's final grade.

The final evaluation rests with the teacher, who will need to develop specific criteria for making judgments regarding what students have achieved. Some things to be considered might be:

- Measuring growth and progress
- Giving credit for concepts mastered
- Rewarding effort and involvement and giving each student a chance to succeed
- Rewarding creative and imaginative solutions
- Utilizing the Design/Production Process
- Assessing student ability to record ideas by using the technical drawing areas
- Using quizzes, exams, class critiques.

When developing quizzes, exams and class critiques, try to test for information that addresses all seven constants and contributes to the holistic approach of the curriculum.

Teachers may decide to add additional items to complete the process for evaluating student success. The process one plans on using should be determined prior to teaching the course. At the beginning of each semester, teachers should inform students how they will be evaluated.

THE DESIGN/PRODUCTION PROCESS

The Design/Production Process is employed in industry as an accepted way of ensuring that the flow of a project is efficient and results in the best product for the cost. From the designer's point of view, it is essential to use an *economy of means* as well as an exciting "style" in order to maximize sales and minimize the cost of production. Therefore, good design requires a knowledge of previous design, an acceptance of client need, an understanding of manufacturing/construction processes, and a sensitivity to the marketplace.

A quality design should be expressed in a quality drawing, that is, a visualization that communicates the object with clarity by:

- deciding what type of technical representation to use (orthographic projection, section, perspective, etc.),
- utilizing elements and principles of design in the design activity,
- employing the most efficient style or type of drawing (sketch, rendering, CADD), and
- utilizing rendering techniques (pencil, marker, model, etc.).

SEQUENTIAL STEPS IN THE DESIGN/ PRODUCTION PROCESS

1. Client's needs are assessed
2. Brainstorming/Originality
3. Design conceptualization - based on:

   Manufacturing processes and methods to be used

   Marketing and sales requirements - the 'competitive environment'

   Emotional content, sociologic phenomenon, etc.
4. Visualization
5. Presentation of sketches, and/or models to client
6. Acceptance of design (go to step 8)

   Rejection of design
7. Redesign after client rejection;

   Adjust and resubmit
8. Consult with manufacturing, marketing, environmental and other design groups for additional input
9. Working drawings made
10. Prototypes developed
11. Field testing
12. Acceptance of market or adjust or reject/cancel
13. Mass production.

Design and Drawing for Production

CONSTANTS:

TECHNICAL DRAWING AREA	DESIGN ACTIVITY	RESEARCH AND CRITICAL ANALYSIS	HISTORICAL REFERENCES	SKILLS	LINKAGE	STUDENT RE-QUIREMENTS & CRITERIA FOR EVALUATION
ORTHO-GRAPHIC PROJECTION PICTORIAL DRAWINGS: (ISOMETRIC, OBLIQUE, PERSPECTIVE) SECTIONS AUXILIARIES REVOLUTIONS TRANSITIONS AND DEVELOMENTS				LETTERING, SKETCHING, DIMENSIONING, RENDERING, USE OF SCALE AND DRAWING CONVENTIONS TOOL AND EQUIPMENT USAGE COMPUTER ASSISTED DESIGN AND DRAWING	PRODUCTION: MANUFACTUR-ING OR CONSTRUC-TION SYSTEMS TRANSPOR-TATION SYSTEMS COMMUNICA-TION SYSTEMS CAREER AWARENESS	DESIGN SOLUTION: FUNCTIONAL AND AESTHETIC AND/OR STYLISTIC APPEAL DRAWING PRESENTATION: SIZE MEDIUM MATERIAL TIME TECHNIQUE

TEACHER DIRECTED

Design and Drawing for Production

A TYPICAL EXAMPLE:

TECHNICAL DRAWING AREA	DESIGN ACTIVITY	RESEARCH AND CRITICAL ANALYSIS	HISTORICAL REFERENCES	SKILLS	LINKAGE	STUDENT REQUIREMENTS & CRITERIA FOR EVALUATION
ORTHO-GRAPHIC PROJECTION	THE STUDENT WILL DESIGN A TOASTER FOR USE IN THE YEAR 2050, UTILIZE ELEMENTS AND PRINCIPLES OF ART SCALE 1:2	DEFINING THE FUNCTION: ELECTRIC POWERED KITCHEN APPLIANCE, EJECTS PROCESSED FOODSTUFF, IS CONTROLLABLE	TEACHER WILL PRESENT EXAMPLES OF KITCHEN APPLI-ANCES OF THE 1930s, 1950s & 1980s FOR STYLE AND CHARACTER-ISTICS OF ERA. DISCUSS THE FUTURE OF KITCHEN DESIGN, FAMILY LIFE, INFLUENCES OF TECHNOLOGY.	FREEHAND SKETCHING, RENDERING DIMENSION-ING, LETTERING	PRODUCTION: MANUFACTUR-ING USE DESIGN/ PRODUCTION PROCESS TO IDENTIFY THE DESIGN TASK IN PREPARA-TION FOR MAN-UFACTURING - EXAMPLES OF MANUFAC-TURING METHODS AND/OR ASSEMBLY LINE	ORIGINALITY OF DESIGN AND QUALITY OF DRAWING, USE OF MEDIUM, TECHNIQUE, SCALE

Design and Drawing for Production

A TYPICAL EXAMPLE:

TECHNICAL DRAWING AREA	DESIGN ACTIVITY	RESEARCH AND CRITICAL ANALYSIS	HISTORICAL REFERENCES	SKILLS	LINKAGE	STUDENT REQUIREMENTS
ORTHO-GRAPHIC PROJECTION AND/OR THE OTHER TECHNICAL DRAWINGS AREAS AS RAMIFICATIONS	THE STUDENT WILL DESIGN A TOASTER FOR USE IN THE YEAR 2050, UTILIZE ELEMENTS AND PRINCIPLES OF ART SCALE 1:2	DEFINE THE FUNCTION: ELECTRONIC POWERED KITCHEN APPLIANCE; EJECTS PROCESSED FOODSTUFF; IS CONTROLLABLE	TEACHER WILL PRESENT EXAMPLES OF KITCHEN AP-PLIANCES OF THE 1930s, 1950s & 1980s FOR STYLE AND CHARACTER-ISTISC OF ERA. DISCUSS THE FUTURE OF KITCHEN DESIGN, FAMILY LIFE, INFLUENCES OF TECHNOLOGY	FREEHAND SKETCHING, RENDERING, DIMENSIONING LETTERING	PRODUCTION: MANUFACTUR-ING USE DESIGN/ PRODUCTION PROCESS TO IDENTIFY THE DESIGN TASK IN PREPARA-TION FOR MAN-UFACTURING - EXAMPLES OF MANUFAC-TURING METHODS AND/OR ASSEMBLY LINE	ORIGINALITY OF DESIGN AND QUALITY OF DRAWING, USE OF MEDIUM, TECHNIQUE, SCALE

Six general areas of drawing competency have been identified as the essential modes of graphic communication. By reaching acceptable performance goals, the student should be able to identify which drawing method should be used to express a design to another individual. This recognizes that mere 'plate copying' has taught only method and not application, therefore the fundamental emphasis shifts as drawing is recognized as a tool, a means towards a specific end. When focusing on a specific technical drawing area, the student may become further involved in the design and drawing process. This may lead to additional experiences in other technical drawing areas.

Design and Drawing for Production

A TYPICAL EXAMPLE:

TECHNICAL DRAWING AREA	DESIGN ACTIVITY	RESEARCH AND CRITICAL ANALYSIS	HISTORICAL REFERENCES	SKILLS	LINKAGE	STUDENT REQUIREMENTS & CRITERIA FOR EVALUATION
ORTHOGRAPHIC PROJECTION	THE STUDENT WILL DESIGN A TOASTER FOR USE IN THE YEAR 2050, UTILIZE ELEMENTS AND PRINCIPLES OF ART SCALE 1:2	DEFINING THE FUNCTION: ELECTRIC POWERED KITCHEN APPLIANCE, EJECTS PROCESSED FOODSTUFF, IS CONTROLLABLE	TEACHER WILL PRESENT EXAMPLES OF KITCHEN APPLIANCES OF THE 1930s, 1950s & 1980s FOR STYLE AND CHARACTERISTICS OF ERA. DISCUSS THE FUTURE OF KITCHEN DESIGN, FAMILY LIFE, INFLUENCES OF TECHNOLOGY.	FREEHAND SKETCHING, RENDERING DIMENSIONING, LETTERING	PRODUCTION: MANUFACTURING USE DESIGN/ PRODUCTION PROCESS TO IDENTIFY THE DESIGN TASK IN PREPARATION FOR MANUFACTURING - EXAMPLES OF MANUFACTURING METHODS AND/OR ASSEMBLY LINE	ORIGINALITY OF DESIGN AND QUALITY OF DRAWING, USE OF MEDIUM, TECHNIQUE, SCALE

The teacher directed activities must achieve a maximum stretching of the student's power of imagination and application of the elements and principles of design. The student should become familiar with architectural, industrial, and engineering design problems and methods of presenting them to designers. The essence of this course should be reflected in provocative problem statements and activites. The student should become involved in critical thinking and creative problem-solving skills.

Design and Drawing for Production

A TYPICAL EXAMPLE:

TECHNICAL DRAWING AREA	DESIGN ACTIVITY	RESEARCH AND CRITICAL ANALYSIS	HISTORICAL REFERENCES	SKILLS	LINKAGE	STUDENT REQUIREMENTS & CRITERIA FOR EVALUATION
ORTHOGRAPHIC PROJECTION	THE STUDENT WILL DESIGN A TOASTER FOR USE IN THE YEAR 2050, UTILIZE ELEMENTS AND PRINCIPLES OF ART SCALE 1:2	DEFINING THE FUNCTION: ELECTRIC POWERED KITCHEN APPLIANCE, EJECTS PROCESSED FOODSTUFF, IS CONTROLLABLE	TEACHER WILL PRESENT EXAMPLES OF KITCHEN APPLIANCES OF THE 1930s, 1950s & 1980s FOR STYLE AND CHARACTERISTICS OF ERA. DISCUSS THE FUTURE OF KITCHEN DESIGN, FAMILY LIFE, INFLUENCES OF TECHNOLOGY.	FREEHAND SKETCHING, RENDERING DIMENSIONING, LETTERING	PRODUCTION: MANUFACTURING USE DESIGN/ PRODUCTION PROCESS TO IDENTIFY THE DESIGN TASK IN PREPARATION FOR MANUFACTURING - EXAMPLES OF MANUFACTURING METHODS AND/OR ASSEMBLY LINE	ORIGINALITY OF DESIGN AND QUALITY OF DRAWING, USE OF MEDIUM, TECHNIQUE, SCALE

Identification of the very nature of the object to be designed is critical if a meaningful solution is to be achieved. The student shall analyze the functional aspects of the object by determining what it does, how it functions, what work must it do, etc. This analysis should lead to conceptualization and visualization of creative solutions taking into account historical and futuristic considerations. The student should be exposed to questions such as: What is the root of the product? What is the place of the product in the enivironmental scheme of things?

Design and Drawing for Production

A TYPICAL EXAMPLE:

TECHNICAL DRAWING AREA	DESIGN ACTIVITY	RESEARCH AND CRITICAL ANALYSIS	HISTORICAL REFERENCES	SKILLS	LINKAGE	STUDENT REQUIREMENTS & CRITERIA FOR EVALUATION
ORTHO-GRAPHIC PROJECTION	THE STUDENT WILL DESIGN A TOASTER FOR USE IN THE YEAR 2050, UTILIZE ELEMENTS AND PRINCIPLES OF ART SCALE 1:2	DEFINING THE FUNCTION: ELECTRIC POWERED KITCHEN APPLIANCE, EJECTS PROCESSED FOODSTUFF, IS CONTROLLABLE	TEACHER WILL PRESENT EXAMPLES OF KITCHEN APPLI-ANCES OF THE 1930s, 1950s & 1980s FOR STYLE AND CHARACTER-ISTICS OF ERA. DISCUSS THE FUTURE OF KITCHEN DESIGN, FAMILY LIFE, INFLUENCES OF TECHNOLOGY.	FREEHAND SKETCHING, RENDERING DIMENSIONING, LETTERING	PRODUCTION: MANUFACTUR-ING USE DESIGN/ PRODUCTION PROCESS TO IDENTIFY THE DESIGN TASK IN PREPARA-TION FOR MAN-UFACTURING - EXAMPLES OF MANUFACTURING METHODS AND/OR ASSEMBLY LINE	ORIGINALITY OF DESIGN AND QUALITY OF DRAWING, USE OF MEDIUM, TECHNIQUE, SCALE

Utilizing examples and precedents from significant time periods, the student will understand a correlation among designed objects. Societal-cultural influences, technology of the period, and aesthetic criteria all affect what is designed, manufactured, and purchased. The student might be asked to report on one of these eras to show evidence of understanding historical influences.

Design and Drawing for Production

A TYPICAL EXAMPLE:

TECHNICAL DRAWING AREA	DESIGN ACTIVITY	RESEARCH AND CRITICAL ANALYSIS	HISTORICAL REFERENCES	SKILLS	LINKAGE	STUDENT REQUIREMENTS & CRITERIA FOR EVALUATION
ORTHO-GRAPHIC PROJECTION	THE STUDENT WILL DESIGN A TOASTER FOR USE IN THE YEAR 2050, UTILIZE ELEMENTS AND PRINCIPLES OF ART SCALE 1:2	DEFINING THE FUNCTION: ELECTRIC POWERED KITCHEN APPLIANCE, EJECTS PROCESSED FOODSTUFF, IS CONTROLL-ABLE	TEACHER WILL PRESENT EXAMPLES OF KITCHEN APPLI-ANCES OF THE 1930s, 1950s & 1980s FOR STYLE AND CHARACTER-ISTICS OF ERA. DISCUSS THE FUTURE OF KITCHEN DESIGN, FAMILY LIFE, INFLUENCES OF TECHNOLOGY.	FREEHAND SKETCHING, RENDERING DIMENSIONING, LETTERING	PRODUCTION: MANUFACTUR-ING USE DESIGN/ PRODUCTION PROCESS TO IDENTIFY THE DESIGN TASK IN PREPARA-TION FOR MAN-UFACTURING - EXAMPLES OF MANUFAC-TURING METHODS AND/OR ASSEMBLY LINE	ORIGINALITY OF DESIGN AND QUALITY OF DRAWING, USE OF MEDIUM, TECHNIQUE, SCALE

The student's work should demonstrate a competency in the technical drawing area(s). This example is in orthographic projection. Some drawing conventions to be successfully accomplished by the student include the ability to visualize and sketch freehand, dimension the objects in an orthographic projection to standard, and letter with clarity and precision to ease communication with others along the design-manufacturing continuum. As other technical drawing areas are experienced, other drawing conventions may apply.

Design and Drawing for Production

A TYPICAL EXAMPLE:

TECHNICAL DRAWING AREA	DESIGN ACTIVITY	RESEARCH AND CRITICAL ANALYSIS	HISTORICAL REFERENCES	SKILLS	LINKAGE	STUDENT REQUIREMENTS & CRITERIA FOR EVALUATION
ORTHO-GRAPHIC PROJECTION	THE STUDENT WILL DESIGN A TOASTER FOR USE IN THE YEAR 2050, UTILIZE ELEMENTS AND PRINCIPLES OF ART SCALE 1:2	DEFINING THE FUNCTION: ELECTRIC POWERED KITCHEN APPLIANCE, EJECTS PROCESSED FOODSTUFF, IS CONTROLL-ABLE	TEACHER WILL PRESENT EXAMPLES OF KITCHEN APPLI-ANCES OF THE 1930s, 1950s & 1980s FOR STYLE AND CHARACTER-ISTICS OF ERA. DISCUSS THE FUTURE OF KITCHEN DESIGN, FAMILY LIFE, INFLUENCES OF TECHNOLOGY.	FREEHAND SKETCHING, RENDERING DIMENSIONING, LETTERING	PRODUCTION: MANUFACTUR-ING USE DESIGN/ PRODUCTION PROCESS TO IDENTIFY THE DESIGN TASK IN PREPARATION FOR MANUFAC-TURING - EXAMPLES OF MANUFAC-TURING METHODS AND/OR ASSEMBLY LINE	ORIGINALITY OF DESIGN AND QUALITY OF DRAWING, USE OF MEDIUM, TECHNIQUE, SCALE

The student should understand the relationship between the experiences provided through the Design Activity Brief and the design/production process. The student should identify types of manufacturing processes such as casting, injection molding, and extrusion, and discuss how design influences and is influenced by the methods of manufacturing. Emotional appeal, marketing, sales criteria, and career awareness options should be included.

Design and Drawing for Production

A TYPICAL EXAMPLE:

TECHNICAL DRAWING AREA	DESIGN ACTIVITY	RESEARCH AND CRITICAL ANALYSIS	HISTORICAL REFERENCES	SKILLS	LINKAGE	STUDENT REQUIREMENTS & CRITERIA FOR EVALUATION
ORTHO-GRAPHIC PROJECTION	THE STUDENT WILL DESIGN A TOASTER FOR USE IN THE YEAR 2050, UTILIZE ELEMENTS AND PRINCIPLES OF ART SCALE 1:2	DEFINING THE FUNCTION: ELECTRIC POWERED KITCHEN APPLIANCE, EJECTS PROCESSED FOODSTUFF, IS CONTROLL-ABLE	TEACHER WILL PRESENT EXAMPLES OF KITCHEN APPLI-ANCES OF THE 1930s, 1950s & 1980s FOR STYLE AND CHARACTER-ISTICS OF ERA. DISCUSS THE FUTURE OF KITCHEN DESIGN, FAMILY LIFE, INFLUENCES OF TECHNOLOGY.	FREEHAND SKETCHING, RENDERING DIMENSIONING, LETTERING	PRODUCTION: MANUFACTUR-ING USE DESIGN/ PRODUCTION PROCESS TO IDENTIFY THE DESIGN TASK IN PREPARA-TION FOR MAN-UFACTURING - EXAMPLES OF MANUFAC-TURING METHODS AND/OR ASSEMBLY LINE	ORIGINALITY OF DESIGN AND QUALITY OF DRAWING, USE OF MEDIUM, TECHNIQUE, SCALE

Student achievement will be evaluated by meeting specific criteria as well as other objectives determined by the teacher. In this example, the quality of the design in terms of both the function and the aesthetic and/or stylistic appeal is important . The drawing quality is evaluated based on accepted standards in the studio and industry. Students with handicapping conditions may need to be provided with certain alternative testing techniques applicable to a variety of testing situations. See Appendix D for information on alternative testing techniques.

SAMPLE DESIGN ACTIVITY BRIEFS

These are merely **samples** of Design Activity Briefs for each of the six technical drawing areas to be covered during the 40 week, two-semester course implementing this syllabus.

It is advised that teachers use these as they are intended, as **samples only**. Use the blank form to develop your own.

TECHNICAL DRAWING AREA: **ORTHOGRAPHIC PROJECTION**

DESIGN ACTIVITY: A cooperative nursery school has developed a creative activity that involves using blocks of different shapes and sizes. These blocks will be put together by the children to enhance their creativity and motor skills.

The blocks should be designed in such a way that they can be easily manipulated by preschool children. They may be stacked, interlocked or aligned. The materials of which they are made should be such that the blocks will be durable, colorful, easy to store and safe. They should not be able to be swallowed or made of toxic substances. The shapes and sizes are your choice.

RESEARCH AND CRITICAL ANALYSIS: Sculptors utilize geometric forms. Examples of geometric forms will be presented to show their application. A discussion of basic geometric forms and their proportions as well as the characteristics of applicable materials such as wood, plastics, etc. will occur.

HISTORICAL REFERENCES: Historical and architectural references where blocks and forms were used in creating significant structures will be cited.

SKILLS: On a "B" size sheet using a technical pen and colored pencil draw two views of each block. Outline with pen and color. Dimension each block. There is a minimum of five blocks.

LINKAGE: Manufacturing: Wood production
Molded plastics

STUDENT REQUIREMENTS & CRITERIA FOR EVALUATION:

DESIGN: Adherence to design criteria, ease of use, flexibility of assembly, use of color.

DRAWING: Arrangement of views on sheet, technical accuracy, correct representation of objects, adherence to standard drawing conventions.

ORTHOGRAPHIC PROJECTION

TECHNICAL DRAWING AREA:

DESIGN ACTIVITY:

Perhaps no domestic furnishing has changed more drastically than the clock. No longer constrained by its mechanism, the face becomes arbitrary, dependent only on the dictates of fashion, style and public acceptance. The wristwatch has also undergone a similar transformation.

As a designer for the Dynamic Time Corp. you will design either a wristwatch or clock that expresses a particular era or design style. For instance, the "retro" style of the 1930's or the high tech style of the 1980's should be clearly recognized by adapting the design and materials to create the solution. If you work with a watch, the band is an integral part of the design. A clock can be a piece of furniture or can break away from all former constraints.

RESEARCH AND CRITICAL ANALYSIS:

The economics and status of this type of apparel or home furnishing is a consideration.

HISTORICAL REFERENCES:

Investigate timekeeping devices: from the sand glass to the nuclear clock at the National Observatory, the pocketwatch to the inexpensive wrist-microcomputer. The influence of time, style, materials and mechanisms have all influenced the appearance of these devices.

SKILLS:

Orthographic on white stock in pencil, scale as necessary to fill a "B" size sheet, auxiliary if needed. The rendering will be in colored marker and pencil, single pictorial view.

The consumer, advertising and the object share a commonality.

LINKAGE:

Manufacturing must adapt to use certain materials that are not only cost effective but instill a sense of status or identification on the user (e.g., the scientist wears the Casio and the wealthy, the Rolex).

STUDENT REQUIREMENTS & CRITERIA FOR EVALUATION:

DESIGN:

The orthographic should be descriptive in order to provide detail for the manufacturing division. The rendering will be reflective of the time period or era of the object. Artistic conventions of that style should be employed. It is a sales' tool and must be highly dramatic.

DRAWING:

Orthographic conventions: hidden lines, projections, dimensions, etc. Rendering should be appealing.

TECHNICAL DRAWING AREA:

PICTORIAL (oblique)

DESIGN ACTIVITY:

Though more shoes are currently being designed (some even engineered) for more uses than ever before, urban pedestrians continue to wander between fashion and comfort. Suppose you were a professional at work in a major city. What would you look for in a shoe?

Design a shoe for a male or female who works inside an office, sits 80 percent of his/her work day and commutes to work via mass transportation. The shoe should make a statement and offer style to suit the function.

Today's consumers are more than ever exposed to the influence of design in everyday objects. High quality design has spread to every imaginable object, from coffee cups to coffee makers. When people choose a finely designed clock, lamp, vase or decorative accessory, they are making a statement. A product is something to live with, not just a functional object.

RESEARCH AND CRITICAL ANALYSIS:

Collect catalogs with visual displays of shoes described by stores such as: Bloomingdales, Bambergers, Berdorf/Goodman and L.L. Bean. Collect interviews from the people who would use this item. Pay close attention to shoe and sneaker ads which often appear in an architectural elevation, plans and cut-aways. Why? Examine and discuss function of style and comfort.

HISTORICAL REFERENCES:

Refer to old catalogs with visual displays of shoes from various time periods. Examine materials providing information on the history of the shoe and the styles and changes it has undergone throughout the years.

SKILLS:

The final drawing should be on 18"x24" vellum. Use markers and colored pencils as a technique. You may wish to begin with modeling materials to facilitate design.

LINKAGE:

In order to better understand the process in production, the design for function must be dissected and planned in a pattern form so that manufacturing is feasible.

STUDENT REQUIREMENTS & CRITERIA FOR EVALUATION

DESIGN:

Based on the individual student's visual description, does the design offer comfort or any other functional criteria supported by the purpose?

DRAWING:

This drawing should offer communication for the purposes of production. The 3-D transition should allow more understanding of the general form. Basic marker and pencil techniques should be utilized in the initial rendering.

PICTORIAL DRAWING (ISOMETRIC)

TECHNICAL DRAWING AREA:

DESIGN ACTIVITY:

A company that manufactures fishing lures has decided to produce a new line of lures. These are intended specifically to catch fresh water bass. The lures can take the form of spinners, spoons, or plugs or artificial worms, bugs, or fish. Combinations of these forms are possible. The lure should have a design that creates movement and transmits color flashers when retrieved by the fishermen.

As a free lance designer, you have been requested to submit a fishing lure design for approval and production. If your design is accepted, a commission will be paid on each lure sold.

Most fishermen are willing to spend freely for successful equipment so there is no limit regarding materials and total cost.

RESEARCH AND CRITICAL ANALYSIS:

Examine popular existing bass lures. Talk to experienced bass fishermen and obtain their opinions regarding the type and style of lures they have found to be successful. From books, fish and game organizations and conservation organizations, learn about the living and eating habits of bass that would influence lure design.

HISTORICAL REFERENCES:

Visit or contact museums to learn about historical and ancient lures. Examine old fishing equipment catalogs. Read literature or adventure stories about people fashioning fishing lures for survival purposes. Relate development of new technology and materials to the development of new lure styles and effectiveness.

SKILLS:

Make color sketches of three different lures. Models may be utilized in lieu of the sketches.

Models may facilitate design work and final drawing. Select the best design and draw it in isometric on a 12"x18" sheet of vellum. Make drawing full size or enlarge if larger drawing will make better presentation. Color drawing with pencils or markers. Dimension appropriately.

LINKAGE:

Consider the type or kind of materials or combination of materials to be used in the manufacture of the lure.

Processes of manufacturing and assembly should be considered. What materials are appropriate to withstand the stress and environmental factors involved? What are the effects of color, noise, movement, scent, texture and materials selected on attracting and hooking bass?

STUDENT REQUIREMENTS & CRITERIA FOR EVALUATION:

DESIGN: The lure can be expected to attract and catch bass. The design should be a new and different concept. The company should be able to produce the lure through manufacturing. It should withstand normal use. The design should have sales appeal to fishermen.

DRAWING: The final isometric drawing should be correctly represented and dimensioned. Appropriate techniques should be utilized to draw curved surfaces. The preliminary sketches are submitted. Coloring should assist visualization.

PICTORIAL (PLAN)

TECHNICAL DRAWING AREA:

DESIGN ACTIVITY:

Those 4x4 trucks are really hot items in car dealerships today. The most exciting vehicles are the ones that look tough, mean and fast. One factor that impresses the buyer is the type of wheel on the truck.

As a member of Jujimoto Ltd., your design group is to upgrade the 16" alloy wheel on the Magno V20 SportsBasher. The vehicle has been designed for on and off-road use, has high wheel clearance and 4-wheel disc brakes. Alloys available are aluminum, magnesium and titanium. The list price for the premier model is $11,000.00 U.S.

RESEARCH AND CRITICAL ANALYSIS:

Assembling a portfolio of trucks that are currently sold is the starting point. The emotional content of each design (particularly wheels) should be discussed. Marketing strategies and target groups for purchases should be discussed as well.

HISTORICAL REFERENCES:

A history of commercial vehicles should be undertaken as well as a study of how this type of sport truck fits into the scheme of history.

SKILLS:

The completed drawing will be a tonal rendering in a plan (1 view orthographic) view. Scale will be 1:2. Pencil on smooth white stock.

LINKAGE:

The change from manual to robotic manufacturing in the auto industry should be discussed. Point out the nature of the wheel materials, cost vs. strength, etc. Systems of metal working should be revealed.

STUDENT REQUIREMENTS & CRITERIA FOR EVALUATION

DESIGN:

Excitement, vigorous motion, texture and the emotional dynamic should be present. Originality will also be considered. Brake colling, mud shedding and vehicular aspects should be evident.

DRAWING:

Rendering must be to scale and show evidence of tool usage. No strokes are to be seen as a drawing such as this has continuous tonality (100%=black; 0%=white).

TECHNICAL DRAWING AREA: **SECTIONS**

DESIGN ACTIVITY: You are an American living at the turn of the century (2000). Transporting students in an urban center continues to be problematic since students now live in outlying areas and inside the center. They all attend school at times which are individually determined.

To be cost effective, a need exists to develop a transportation vehicle which moves no more than five students at a time, stops on a dime and maneuvers quickly within the urban setting. The design must follow the State Education Law concerning vehicles for student use.

This design must also concern itself with ergonometric measurements. Style of propulsion is left to the student. The scale is the teacher's choice.

RESEARCH AND CRITICAL ANALYSIS: Discuss Education Law...a need exists; therefore, a development occurs. Discuss a variety of propulsion methods (e.g., land, air, sea, powered by gasoline, atomic reaction, human, solar, water, electric, animal). Is the unit driven, track or monorail mounted, computer controlled?

HISTORICAL REFERENCES: Discuss the needs and design considerations of the first school bus (1918).

SKILLS: Dimensioning and use of scale for design. Elevation, plan and section in order to demonstrate the full potential of the design idea.

LINKAGE: Transportation: What are the balances that must be accommodated in mass transit? Who pays, who rides, where should it be built, etc.?

STUDENT REQUIREMENTS & CRITERIA FOR EVALUATION:

DESIGN: An examination of the criteria should be revealed in the design. Could the design accommodate students? Were allegations for the year 2000 addressed? Did the student adhere to the Education Law?

DRAWING: The drawing should include an elevation plan and section view. The section view should conform to accepted standards and conventions. All work should be neat and dimensioned properly.

SECTIONS

TECHNICAL DRAWING AREA:

DESIGN ACTIVITY:

Ever since the invention of the wheel we have attempted to model better forms of transportation. Design a vehicle which would simplify and improve urban travel. You may use any materials, technological device or method to develop a fantastic solution of how to avoid traffic and stress. Consider the problems of the urban development. Maximum efficiency in terms of people, fuel consumption, space and the environment are among many relevant considerations.

Sketch your ideas in loose rendering style. Develop an elevation of two views. Include two sections to demonstrate the materials used. Use colored marker techniques to help indicate the materials used.

RESEARCH AND CRITICAL ANALYSIS:

Consult "Consumer Reports" magazine issues featuring automobiles. This allows for opportunities to discuss the features of current trends. Utilize any futuristic materials as a reference (e.g., movies, T.V., video).

HISTORICAL REFERENCES:

Refer to Raymond Loewy and Norman Belle Geddes by reviewing their development of the speed symbol, the tear drop. How did it affect their designs?

SKILLS:

Sketching, rendering, drawing conventions.

LINKAGE:

The most obvious linkage is with transportation systems. Considerations of the futuristic materials and societal needs address the values and responsibilities we currently use.

STUDENT REQUIREMENTS & CRITERIA FOR EVALUATION:

DESIGN:

Does the design express a solution to the need of the development of a vehicle designed to alleviate the stress of urban commuting and the congestion we currently endure?

DRAWING:

Does the visual communicate the materials used for the vehicle in using the section?

TECHNICAL DRAWING AREA: **SECTIONS**

DESIGN ACTIVITY: A local lumber company has determined that there is a market for planters that would be used outside on a deck, patio or near an entry to a house. You have been given the commission to design a prototype of one planter.

Standard building materials will be used in its construction. The planter can be any shape. Size must be a consideration so that it may be relocated if necessary. An interesting design and ease of construction are the primary design criteria. Although the planter is to be constructed mainly of wood, other materials may be used for ornamentation. A list of building materials must accompany the drawing.

RESEARCH AND CRITICAL ANALYSIS: A discussion of the large variety of building materials available, their characteristics and cost will occur. Various means of attachment should also be introduced. The student will visit a local lumber yard to explore the materials available. Samples of building materials will be made available to the students to handle and view.

HISTORICAL REFERENCES: A discussion of the historical applications of planting devices and their relationship to architecture will occur.

SKILLS: On a "B" size sheet draw one primary view of the planter and one section view. Scale: 1 1/2"=1'0". The section view should be clearly labeled to indicate assembly. A full scale prototype may be constructed for display/sale.

LINKAGE: Construction.

STUDENT REQUIREMENTS & CRITERIA FOR EVALUATION:

DESIGN: Interesting design, application of building materials, ease of construction.

DRAWING: Technical accuracy, neatness, line definition, materials list.

SECTIONS

TECHNICAL DRAWING AREA:

DESIGN ACTIVITY:

In the current "Post Modern" era in architecture, wall sconces are frequently being utilized for vertical wall lighting, lighting architectural details and subtle background lighting.

A lighting designer has asked that you design a wall sconce in the "Post Modern" style. The sconce can be designed for either residential or commercial application. Considerations of material, attachment and light source are of primary importance.

RESEARCH AND CRITICAL ANALYSIS:

Examples or photos of some wall sconces that are presently being marketed will be presented.

Lighting galleries will be visited by the students to see first hand existing sconces.

HISTORICAL REFERENCES:

Various periods of architecture that involved the application of wall sconces will be discussed.

SKILLS:

On a "C" size sheet, draw one primary view and a section view in a scale of 3"=1'-0". Felt tip marker .03 & .07 should be used. Basic dimensioning should be applied. Indicate thickness of material and lighting source in the section view.

LINKAGE:

Manufacturing.

STUDENT REQUIREMENTS & CRITERIA FOR EVALUATION:

DESIGN:

Originality, use of materials, means of attachment, light source, application to "Post Modernism".

DRAWING:

Technical accuracy, layout on sheet, use of pens, neatness.

TECHNICAL DRAWING AREA: **AUXILIARIES**

DESIGN ACTIVITY: A medical supply company has determined that there is a need for a specialized vertical container with a lid. It must be easily recognized through its form and color.

The container must hold a minimum of 16 fl. ounces and not more than 20 fl. ounces. Its top must be truncated on a 30 degree angle. The lid should be flexible, stay secure to the body of the container, prevent leakage and allow a 1/4" tube to go through it parallel to the sides of the container. The tube should be held snugly as it goes through the lid. The container must be unbreakable, safe, light, inexpensive and resistant to corrosion. Scale is 1:1.

RESEARCH AND CRITICAL ANALYSIS: Student will collect, observe and investigate a variety of lidded containers. Research formulas for determining appropriate size of container, dependent on form used.

HISTORICAL REFERENCES: Present examples of containers past and present and how technology influences their designs.

SKILLS: Consider preliminary sketches; include location and size dimensions, appropriate drawing conventions and use of felt tip markers.

LINKAGE: How will materials affect cost and practicality? What types of containers manufactured would be the most cost efficient?

STUDENT REQUIREMENTS & CRITERIA FOR EVALUATION:

DESIGN: Does the design conform with the criteria as stated? Have the needs of the client been adequately satisfied?

DRAWING: Does the drawing explain the designer's idea through appropriate drawing conventions and the technical drawing art? Does it indicate accuracy in measuring proper line weight, projection quality lettering and overall neatness?

AUXILIARIES

TECHNICAL DRAWING AREA:

DESIGN ACTIVITY:

A shoe manufacturer wants to popularize its name by sponsoring a competition to design an old-fashioned shoeshine box.

The device must include an inclined surface upon which to rest the shoe(s) being shined. The box must be small enough to carry and have a storage cavity for polish and brushes.

RESEARCH AND CRITICAL ANALYSIS:

This device is a self-contained maintenance facility tool-box. What other devices like this exist? How have shoes changed in appearance over the years. Are all shoes to be shined? How do you keep your shoes clean?

Research the development and function of the shoeshine box.

HISTORICAL REFERENCES:

Describe the function and evolution of the shoeshine box since the turn of the century.

SKILLS:

Size and scale of drawing are important. Most solutions will incorporate a slanted surface. A primary auxiliary drawing should be executed to show the true size and shape of the foot rest part. Pencil and appropriately sized paper can be used.

LINKAGE:

Shoeshine devices may be individually or mass produced. What differences might one find?

STUDENT REQUIREMENTS & CRITERIA FOR EVALUATION

DESIGN:

Is the design effective, attractive and best suited for its purpose?

DRAWING:

Is drawing correctly executed? Is it neat, accurate, etc.?

TECHNICAL DRAWING AREA:

REVOLUTIONS, ORTHOGRAPHIC PROJECTION

DESIGN ACTIVITY:

The all nanosecond whistling choir of the First Church of Computer Scientists whose motto is "Computer Over Matter" is in need of a new church "trademark" steeple. The steeple must be simple in form, symbolic of its beliefs, and rotate at its base. The choir wishes to see a proposal which will show the "trademark" steeple from many different angles.

Scale: 1/4"=1'; Size "C" paper; the base cannot exceed 4'x 4' and the height from base to top cannot exceed 12'; it must be made from strong and weather resistant materials. Provide the client with preliminary sketches. Create a design which incorporates color and provides the opportunity to render in color (optional).

RESEARCH AND CRITICAL ANALYSIS:

The student researches historical information on trademarks, signs and symbols.

SKILLS:

Sketching/rendering, appropriate drawing conventions, scale, tool and equipment usage. Use of colored pencils is optional.

LINKAGE:

Design process in regard to development of trademark or logo. Relationship between advertising and production process are trademarks designed to be easily transferred to different materials, letters, clothing, billboards, etc.

STUDENT REQUIREMENTS & CRITERIA FOR EVALUATION:

DESIGN:

Does the design meet the criteria as stated in the Design Activity section? Aesthetic functional criteria: aesthetically pleasing, easily recognizable, coherent, simple.

DRAWING:

Does the presentation meet the specifications of the problem? Are appropriate drawing conventions used? Accuracy, neatness, rendering quality (optional)?

REVOLUTIONS

TECHNICAL DRAWING AREA:

DESIGN ACTIVITY:

Graphic designers may spend much of their time designing in two dimensions and working closely with color. It is essential that they have some understanding for drawing in three dimension.

A large perfume company "Alati" has a new package for their perfume bottle. The name "Alati" must be prominent on all four sides of the package. The company would like to see a frontal view and a revolution to three other positions.

RESEARCH AND CRITICAL ANALYSIS:

Type faces and styles should be discussed before the student designs a logo or name for the package.

HISTORICAL REFERENCES:

Using a 1902 Sears-Roebuck Catalog, published in 1969, by Crown Publishers, Inc., 75-99921, each student will select a bottle or container depicted in that catalog. The student will describe the design and why it is the style of that time.

SKILLS:

The paper will be divided into quarters. An orthographic projection will be drawn of the object to true scale in the first quadrant. In quadrant #2, the front view will be rotated 30 degrees to the right. In quadrant #3, the right side's view will be rotated forward 15 degrees, then the remaining views will be drawn. In quadrant #4, the top view will be rotated to the right and other views completed.

LINKAGE:

The design must now be xeroxed and/or printed by offset. The printed design will be made by combining three different colors. Much time should be spent in balancing the color to match the designer's color scheme. The drawings will be made at one-half scale with pencil on paper.

STUDENT REQUIREMENT & CRITERIA FOR EVALUATION:

DESIGN:

Many designs are critiqued by panels or groups of people. Select four students who will act as design critics. These critics will divide the designs into three categories: Good, Better and Best.

DRAWING:

Are the views properly done? Does the design match the color scheme?

TECHNICAL DRAWING AREA:

TRANSITIONS AND DEVELOPMENTS

DESIGN ACTIVITY:

Construction of objects from flat materials is possible if the designer can design a pattern that efficiently uses the material. Packaging, as an example, is a good reference for these developments. In fact, you might disassemble a box and ask students who view it from the rear (the side/the labels) to attempt to identify it.

Paper models representing buildings that were constructed using the development process could be shown to the students. The student is to draw his/her own vehicle using the proper methodology and conventions that will result in a model that can be scored, folded and glued into position. Graphics may be added.

RESEARCH AND CRITICAL ANALYSIS:

Using the reference provided, demonstrate the methodology of developmental views. Examples of architectural volume or study models are appropriate as are stamped metal toys, particularly "Matchbox" cars.

HISTORICAL REFERENCES:

Primitive dwellings such as cabins and igloos and modern shapes such as geodetic domes could be investigated.

SKILLS:

Use the proper "alphabet of lines" to describe fold and cut lines. Have students find a source (car magazines, brochures) that will serve as reference to aid in the simplification of the form. Tagboard should be used for the final piece. Show originality or modification to existing design form. No scale is needed.

LINKAGE:

This process of die cutting material is seen most frequently in sheet metal working. Ducts for HVAC are common applications. Economy of means and production criteria in this industry are important for students to learn. The impact of CAD-CAM should be developed.

STUDENT REQUIREMENTS & CRITERIA FOR EVALUATION:

DESIGN:

The project should demonstrate the application of the reference and symmetry in an exciting design, including graphics.

DRAWING:

The project should fold evenly with all tabs in place. Drawing conventions, fold lines, cut lines and center lines must be evident. The best pieces will have a great deal of detail.

TRANSITIONS AND DEVELOPMENTS

TECHNICAL DRAWING AREA:

DESIGN ACTIVITY:

An airplane crash high in the Rocky Mountains has left a number of survivors. High winds have made rescue impossible by helicopter. A large snowstorm is expected within the next twenty-four hours.

As a designer for a large container corporation, you have been called by an emergency relief group to design a human shelter that will be made from cardboard. After the design is completed, the shelters will be built from waxed cardboard and dropped from Air National Guard airplanes. The survivors must be able to assemble these shelters.

RESEARCH AND CRITICAL ANALYSIS:

Medical Research: For instance, people cannot remain in a prone position too long without developing pneumonia. *Ventilation*: The moisture would condense as rain or form frost on the inside of the shelter. The humidity level of the air found in the cardboard would be very high.

HISTORICAL REFERENCES:

Investigate structures such as teepees, tents and igloos used by primitive man to provide shelter in the woods.

SKILLS:

The scale should be 1"=1'0".

A development would be made and assembled into a model.

LINKAGE:

When a problem exists, many parts of society react to help reach a solution. When a problem exists in technology, specialists explore the use of various materials. What other materials could be used in the development of a shelter to be assembled by survivors of a similar situation?

STUDENT REQUIREMENTS & CRITERIA FOR EVALUATION:

DESIGN:

Does the structure enclose an adequate amount of space to allow for sitting, sleeping and adequate ventilation?

DRAWING:

The final product is a model which is the product of a drawing. Most drawings are a representation of the final product. In this case the final product is shown.

TECHNICAL DRAWING AREA:

DESIGN ACTIVITY:

RESEARCH AND CRITICAL ANALYSIS:

HISTORICAL REFERENCES:

SKILLS:

LINKAGE:

STUDENT REQUIREMENTS & CRITERIA FOR EVALUATION:

DESIGN:

DRAWING:

SELECTED BIBLIOGRAPHY

BOOKS

Akira Fujimoto, ed. *Luigi Colani-Designing Tomorrow.* Sanei Shoke Pub. Co. Ltd., 1979.

Alexander, et. al. *A Pattern Language.* Oxford University Press, 1977.

Bayer, Herbert, Gropius Walter, Gropius, Ise. *BAUHAUS* The Museum of Modern Art, New York Graphic Society, 1975 ppb.

Behrens, Roy R. *Design In The Visual Arts.* Prentice-Hall, Inc., 1984.

Brand, Steward ed. *The Next Whole Earth Catalog.* Random House, 1981.

Broekhuizen, Richard J. *Graphic Communications.* McKnight Publishing Company, 1979.

Caplan, Ralph. *By Design.* McGraw-Hill, 1982.

Ching, Francis. *Architectural Graphics.* Van Nostrand Reinhold Co., 1975.

Ching, Francis D.K. *Building Construction Illustrated.* Van Nostrand Reinhold Co., 1975.

Dennis, Ervin A. *Comprehensive Graphic Arts.* The Bobbs-Merrill Company, Inc., 1983.

Dinan, John. *Manufacturing.* Glencoe Publishing Company, 1986.

Doyle, Michael E. *Color Drawing.* Van Nostrand Reinhold Co., 1981.

Feirer, John L. and Lindbeck, John R. *Production Technology: Industry Today and Tomorrow.* Bennett and McKnight Publishing Company, 1986.

Giugiaro Design. Kaneko Enterprises, Inc., 1986.

Hacker, Michael. *Technology In Your World.* Delmar Publishers Inc., 1987.

Hayes, Denis. *Rays of Hope: The Transition to a Post-Petroleum World.* W.W. Norton & Co., Enc. N.Y. 1977 ppb.

Henak, Richard M. *Exploring Construction.* Goodheart-Willcox Company, 1985.

High Styles - Twentieth Century American Design. Whitney Museum of American Art, Summit Books, 1985.

Longstreth, Richard. *The Buildings of Main Street - A Guide to Commercial American Architecture.* The Preservation Press, 1987.

MacDonald, Bohn. *Energy, Power and Transportation.* Glencoe Publishing Company, 1986.

Morgan, Hal. *Symbols of America.* Viking-Penguin, Inc., 1986.

The 1902 Edition of the Sears Roebuck Catalog. Bounty Books, Crown Publ., 1969.

Poppeliers, Chambers, Schwartz. *What Style Is It?*. The Preservation Press, 1983.

Qualley, Charles A. *Safety In the Artroom*. Davis Publications, Inc., 1986.

Quayle, Maura. *Ideabook for Teaching Design*. University of British Columbia Press, 1985.

Roukes, Nicholas. *Art Synectics*. Davis Publications, Inc., 1982.

Sandler, Alan et al *The Environmental Education Program of the American Institute of Architect, The Source Book*. Washington, D.C.: AIA, 1981.

Stobauch, Robert and Yergin, Daniel. *Energy Future Report of the Energy Project at the Harvard Business School*. Ballantine Books, N.Y. 1979 ppb.

Walker, Lester. *American Shelter (An Illustrated Encyclopedia of the American Home)*. Overlook Press, 1981.

Wilson, Pilgrim, Tashjiam. *The Machine Age in America 1918-1941*. Harry N. Abrams, 1986.

Winters, Nathan B. *Architecture is Elementary, Visual Thinking Through Architectural Concepts*. Gibbs M. Smith Inc., 1986.

Wright, R. Thomas. *Exploring Manufacturing*. Goodheart-Willcox Company, 1985.

Young, Frank M. *Visual Studies, A Foundation for Artists and Designers*. Prentice-Hall Inc., 1985.

PERIODICALS

Car Styling Quarterly. Car Styling Publishing Co.

Computer Pictures. Electron Pictures Corp.

Consumer Reports. Consumer Reporter Books.

Historic Preservation. National Trust for Historic Preservation, Washington, D.C.

Industrial Design. Whitney Pub., Inc.

Marketing Communications. United Business Publications, Inc.

Metropolis. Bellerphon Publications Inc.

Progressive Architecture. Reinhold Publishing.

ADDITIONAL REFERENCES

City Visions "The Foundation for Architecture," Philadelphia, PA.

New York Times

1985 Annual Reports. United Water Resources.

COMPUTER ASSISTED DESIGN AND DRAWING

A generic description of hardware and software appropriate to DDP is listed below. These materials represent systems that are the equivalent of, or comparable to, equipment currently used or being emplaced in the design professions.

- **IBM compatible computer:**
  Minimum of 640K RAM memory
  Minimum of 20 Meg hard disk.
  Math co-processor chip.
  Monitor in color or 2 monitors (1 green, 1 color).
- **Input device:**
  Digitizer pad w/puck or pen or mouse.
- **Output:**
  Plotter in A/B size as minimum.
- **Software:**
  Professionally oriented, such as Versacad, Autocad.
- **Disks:**
  Double side/double density.
- **Support:**
  Plotter points
  Vellum stock
  Surge/spike suppressor

Or;

- **Apple Macintosh Plus:** W/External disk drive, Mouse

- **Apple Macintosh SE:** W/20 meg hard drive, Mouse
- **Additional input:**
  Tablet similar to Kurta or Summagraphics
- **Output:**
  Plotter or high quality dot-matrix, ink jet or laser printer.
- **Software:**
  MacDraw, MacPaint, MacCad, Versacad, MacDraft, Caddraft or similar.
- **Disks:**
  3.5 Double sided
- **Support:**
  Plotter points
  Vellum stock
  Surge/spike suppressor
  Plotter paper

There is much controversy over what system to purchase for the school environment. The Apple system is easy to learn, can be used to render objects and is extremely "user-friendly." The IBM/compatible based system(s) are standardized to the profession. Each district will certainly have other parameters for acquisition. There are also systems utilizing the Apple IIe and GS but the software does not have the professional linkage for advanced training. Always investigate thoroughly by asking current users in

school and design applications. Software, not hardware, should be the priority for the user.

The important point to remember is that the computer is the technology that has replaced the traditional drawing approach (such as t-square) in architecture, engineering and industrial design.

The student should develop an understanding of how advanced technology is utilized in the design, drawing and production processes.

As applicable, have the student experience using the computer for his/her drawings. This will enable the student to become more competent in performing the steps involved in getting the desired drawing results done both manually and on the computer.

A LISTING OF MATERIALS AND SUPPLIES

The following items have been identified as tools that are necessary for the teacher to use for instruction in DDP. The list expresses the program goal of student exposure to a wide range of processes utilized in technical drawing and rendering which is a valuable characteristic in a basic, entry level course.

Before any ordering of material takes place, however, it is incumbent on the instructor to identify the design activities he or she will actually teach. Only then can an accurate assessment be made of the materials and quantities needed.

DRAWING MEDIA

- Lead pencils:
  Soft - 4B, 2B, HB, Hard - 2H, 4H
- Plastic Leads in same grades
- Colored pencils:
  Sets of a minimum of 24 colors. Extra pencils in white.
- Felt tip pens:
  Fine line black markers: 3mm., 5mm.
- Broad tip permanent markers:
  Designer quality sets in minimum of 24.
  Sets of cool and warm greys.
- Technical drawing pens:
  Disposable or permanent - point sizes: 00, 0, 1, 2.5.
- Wet media:
  Watercolor sets, minimum of 8 colors w/
  Brushes in sizes 7, 5, 3, 1, 3/0 & 5/0
  White tempera or acrylic.
  Permanent ink.
- Crayon:
  Conte crayon sticks in black and sepia.
- Airbrush
- Gouache

BOARDS AND PAPER

- Tracing:
  Yellow architect's tracing rolls - 12" x 50 yds.
- Vellum:
  18 to 20 lb. in sizes A, B, C, D, or 8 1/2 x 11, 18 x 24, 34 x 44.
- Reproduction paper

- Mylar or Polyester Drawing Film:
  3 to 5 mm.
- Board:
  Illustration Board - single ply, cold press (smooth) finish.
- Mounting:
  Foamcore Board - 3/16" thick, 30" x 40".
- Newsprint:
  Minimum size 18" x 24", pad or loose sheets.
- Graph paper:
  1/4 at 8 1/2 x 11.
- Tagboard:
  White tag, 60 lb.

TOOLS

The following items should be on hand to ensure that the student is equipped with all necessary materials for successful design and drawing experiences. Likewise, the computer is to be considered a tool which will assist the student in an advanced technological experience to reach the same end result.

T-squares and/or parallel rules or drafting machines
Triangles
Scales
Compasses (small bow and large divider)
Computer
Modeling tools
White printer for reproduction of drawings
Protective safety glasses

GENERAL SUPPLIES

Steel edge for cutting
Disposable blades or knives
White glue
Balsa wood - 1/8" sticks
Clay - ceramic
Thin wire - 16 - 18 gauge
Needle nose and Linesman's Pliers
Graphic tapes
Glue gun
Templates
Drafting tape
Eraser and shields
Tone film sheets (zipatone)
Instant transfer lettering
Perspective or designer's grids

POTENTIAL HEALTH RISKS IN THE CLASSROOM

Design and Drawing for Production involves the use of markers, paints, inks, cements, glues, clays. It is important for teachers to know what supplies consist of and be cognizant of this information.

The following information is adapted from an April 19, 1983, memo titled: *Chemical Use in Schools*, by Brian P. Walsh, Administrator for Educational Facilities and Management Services of the New York State Education Department.

During the past few years, there has been widespread publicity about the potential danger posed to students by chemicals used in schools. Consequently, many school officials have requested guidance in deciding which chemicals should or should not be used in schools.

In response to those requests, the State Education Department has developed recommendations in the form of guidelines that school officials may use to decide which chemicals can be used with relative safety in schools.

The State Education Department surveyed a group of school districts to determine the identity of chemicals being purchased by schools in the State. The inventory derived from that survey was given to the State Health Department for analysis.

Based on the analysis, the State Education Department recommends the following:

- Any chemical that is identified as a known carcinogen should not be used on school premises.
- Any chemical that is identified as being a known or suspected mutagen and/or suspected carcinogen may be used for instructional purposes (9-12) only under the close supervision of properly trained teaching personnel.

The following items, which comprise only a partial sampling of items commonly found in schools, may contain known or suspected carcinogens:

- Acetamide
- Asbestos
- Benzene
- Cadmium chloride
- Carbon tetrachloride
- Chloroform
- Chromium oxide
- Diarsenic trioxide
- Lead acetate
- Manganese chloride
- Methyl iodide
- Methyl methacrylate
- Nickel
- Electroplating solutions (copper, nickel)
- Indigo carmine
- Indole Butyric Acid (Hormodin)
- Isoamyl alcohol
- (Isopentyl)
- Isobutyl alcohol
- Nickel Sulfate
- Phenol
- Propanol
- Tannic acid
- Vinyl chloride

Some toxic substances are:

- Ammonia (found in xerox machines)
- Duco Cement
- Duplicating fluids
- Rubber cements
- Modeling plasticine clay
- Some markers
- Thinner
- Spray adhesive
- Spray crayolon

The teacher needs to be aware of:

- any allergies a student may have,
- current ventilation in the working area(s),
- sources of carcinogens (labels should be read), and
- student awareness and knowledge of tool safety to avoid accidents when using such items as divider points, razor blades and pencil points.

STUDENTS WITH HANDICAPPING CONDITIONS

The Board of Regents, through revising the Part 100 Regulations of the Commissioner and the Action Plan, has made a strong commitment to integrating the education of students with handicapping conditions into the total school program. According to Section 100.2(s), "Each student with a handicapping condition, as such term is defined in Section 200.1(ii) of this Chapter, shall have access to the full range of programs and services set forth in this Part to the extent that such programs and services are appropriate to such student's special educational needs." Districts must have policies and procedures in place to make sure that students with handicapping conditions have equal opportunities to access diploma credits, courses, and requirements.

The majority of students with disabilities have the intellectual potential to master the curricula content requirements for a high school diploma. Most students who require special education attend regular education classes in conjunction with specialized instruction and/or related services. **These students must attain the same academic standards as their nonhandicapped peers in order to meet these requirements.** For this reason, it is very important that at all grade levels students with handicapping conditions receive instruction in the same content areas so as to receive the same informational base that will be required for proficiency on statewide testing programs and diploma requirements.

The teacher providing instruction through this syllabus/curriculum has the opportunity to provide an educational setting which will enable the students to explore their abilities and interests. Instruction could be provided to handicapped students either by teachers certified in this subject area or by special education teachers. Teachers certified in this subject area would be providing instruction to handicapped students who are recommended by the Committee on Special Education (CSE) as being able to benefit from instruction in a regular educational setting and are appropriately placed in this setting. Special education teachers may also provide this instruction to a class of students with handicapping conditions in a special class setting.

Teachers certified to teach *Design and Drawing for Production* should become aware of the needs of those students with handicapping conditions participating in their classes. Instructional techniques and materials must be modified to the extent appropriate to provide students with handicapping conditions the opportunity to meet diploma requirements. Information or assistance is available through special education teachers, administrators, the Committee on Special Education or a student's Individualized Education Program (IEP).

Strategies for Modifying Instructional Techniques and Materials

1. Prior to having a guest speaker or taking field trips, it may be helpful to structure the situation. Use of a checklist or a set of questions generated by the class will help students focus on relevant information. Accessibility for students with handicapping conditions should be considered when field trips are arranged.
2. The use of computer software may be appropriate for activities that require significant amounts of writing by students.
3. Students with handicapping conditions may use alternative testing techniques. The needed testing modifications must be identified in the student's Individualized Education Program. Both special and regular education teachers need to work in close cooperation so that the testing modifications can be used consistently throughout the student's program.

4. Identify, define and preteach key vocabulary. Many terms in this syllabus are specific and may need continuous reinforcement for some students with handicapping conditions. It would also be helpful to provide a list of these key words to the special education teacher in order to provide additional reinforcement in the special educational setting.
5. Check periodically to determine student understanding of lectures, discussions, demonstrations, etc. and how this is related to the overall topic. Encourage students to express their understanding. It may be necessary to have small group discussions or work with partners to determine this.
6. Provide students and special education teachers with a tape of lectures that contain substantial new vocabulary content and of guest speakers for further review within their special education classes.
7. Assign a partner for the duration of a unit to a student as an additional resource to facilitate clarification of daily assignments, timelines for assignments and access to daily class notes.
8. When assigning long-term projects/reports, provide a timeline with benchmarks as indicators for completion of major project/report sections. Students who have difficulty with organizational skills and time sequence may need to see completion of sections to maintain the organization of a lengthy project/report.

Special education teachers providing this instruction must also become familiar with the goals and objectives of the curriculum. It is important that these teachers provide their students with the same or equivalent information contained in the curriculum.

Regardless of who provides the instruction, the cooperation between teachers of regular and special education programs is essential. It is important for the students as well as the total school environment.

Alternative Testing Techniques

Another consideration in assisting students with handicapping conditions to meet the requirements of regular education is the use of alternative testing techniques. Alternative testing techniques are modifications of testing procedures or formats which provide students with handicapping conditions equal opportunity to participate in testing situations. Such techniques provide the opportunity to demonstrate mastery of skills and attainment of knowledge without being limited or unfairly restricted by the existence of a handicapping condition.

The Committee on Special Education (CSE) is responsible for identifying and documenting a student's need for alternative testing techniques. This determination is made when a student is initially referred to CSE, is reviewed annually for as long as the student receives special education services, and is reviewed when the student is determined to no longer need special education services. **The modifications are to be used consistently throughout the student's educational program.** Principals ensure that students who have been identified by CSE as educationally handicapped are provided the alternative testing techniques which have been recommended by CSE and approved by the Board of Education.

Alternative testing techniques which have been specified on student IEPs for use by a student must be used consistently in both special and regular education settings. Regular classroom teachers should be aware of possible alternative testing techniques and should be skilled in their implementation.

The coordination and cooperation of the total school program will assist in providing the opportunity for a greater number of handicapped students to meet the requirements needed to pursue a high school diploma. The integrated provision of regular education programs, special education programs, remediation, alternative testing techniques, modified teacher techniques and materials, and access to credit through alternatives will assist in enabling such students to pursue high school diplomas to a greater degree. The teacher who provides instruction through this curriculum has a unique opportunity to assist such students in their individual goals.

Additional information on alternative testing modifications is available in the manual entitled *Alternative Techniques for Students with Handicapping Conditions*, which can be obtained from:

New York State Education Department
Office for Education of Children with
Handicapping Conditions
Room 1071 Education Building Annex
Albany, NY 12234

Infusing Awareness of Persons with Disabilities Through Curriculum

In keeping with the concept of integration, the following subgoal of the Action Plan was established:

In all subject areas, revisions in the syllabi will include materials and activities related to generic subgoals such as problem solving, reasoning skills, speaking, capacity to search for information, the use of libraries and increasing student awareness of and *information about the disabled.*

The purpose of this subgoal is to ensure that appropriate activities and materials are available to increase student awareness of disabilities and issues in regard to disabilities.

This curriculum, by design, includes information, activities and materials regarding persons with handicapping conditions. Teachers are encouraged to include other examples as may be appropriate to their classrooms or the situation at hand. Teachers are also encouraged to assess the classroom environment to determine how the environment may contribute to student awareness of persons with disabilities.

STRATEGIES FOR WORKING WITH STUDENTS WITH HANDICAPPING CONDITIONS RECEIVING INSTRUCTION THROUGH THIS SYLLABUS

1. Instructors and administrators should investigate the possibility of computer software that is adapted to the special needs of some students with handicapping conditions. Such adapted software may, for example, allow students to access a program using fewer commands. Information can be obtained by calling The Special Education Software Center, a nationwide clearinghouse, at (800) 327-5892.
2. Some students with handicapping conditions may need special considerations regarding physical accessibility of the drawing classroom. Instructors and administrators should assure that classroom entry, classroom space and tables, desks, tools, computer equipment, etc. can be reached and used by students with limited physical ability. Other possible modifications of instruction and materials may include:
   - large print materials for some students with visual problems;
   - modified seating for students with hearing impairments (seating which allows students to maximize their visual potential); or for students with behavior prob-

lems (seating which allows maximum independence for students who do not perform well in certain group configurations);

- patterns of organization of materials, tools, etc. for students who will benefit from organization and a structured environment;
- clear and explicit directions and warnings that will assure safety for all students in the drawing room.

3. All students with handicapping conditions should be able to participate in appropriate clean-up activities that are part of the expectations of most drawing programs.

4. In general, students with handicapping conditions who are appropriately placed into regular art classes should be able, with modifications of instruction and techniques, to meet the requirements, perform the tasks and achieve the objectives of the curriculum within the range of expectations that have been established for all other students in the classes.

EDUCATING THE GIFTED STUDENT

"Meeting the educational needs of gifted...pupils is a recurring nationwide concern.... Because these pupils have the ability to make rich contributions to our culture and society, developing their individual abilities and building on their unique strengths becomes a matter of great importance.

"The State of New York has consistently urged school districts to plan and develop programs which meet the needs of all children. Each school district is urged to identify its gifted, those pupils who are exceptional because of their extraordinary capabilities. Funds have been allocated (for) the New York State Summer School of the Arts... with (concentrations in) Visual Arts... Nationally known artists...provide instruction," from *Educating The Gifted in New York State,* New York State Education Department, 1976

Chapter 740 of the Commissioner's Regulations defines "gifted pupils" as:

> **"Those pupils who show evidence of high performance capability and exceptional potential in areas such as general intellectual ability, special academic aptitude, and outstanding ability in visual and performing arts."**
> **(September 1, 1982)**

Throughout the State, districts are attempting to meet the needs of students with outstanding ability in the visual arts and continuing to challenge these gifted students. Programs exist within and between districts, often taking advantage of local resources such as colleges, universities, cultural institutions, environmental centers and local art associations. The teacher should check with the guidance counselor of a gifted student.

Educating the Gifted *Design and Drawing for Production* Student

DEFINITION

In establishing goals, objectives, programs, and evaluations in art for gifted students, the art education/technology education teacher should have all possible information about a student's placement. However, before designating a student as gifted, the art education/technology education teacher should be familiar with the various categories employed by the local school district.

IDENTIFICATION

Since there is no Statewide identification procedure for identifying gifted students, each school district develops its own identification procedures. Some typically used procedures include a combination of:

- Behavior rating scales,
- Teacher nominations,
- Parent nominations,
- Biographical inventories,
- Anecdotal records,
- Interest inventories,
- Case studies,

FOUR UNIT DRAFTING SEQUENCE

1 Unit	1 Unit — Introduction to Occupations
1 Unit	1 Unit — Design and Drawing for Production* or 1/2 Unit — Technical Drawing 1/2 Unit — Computer-Aided Design (CAD)
1 Unit	Two 1/2 Unit — Courses selected from seven listed below: (Compatible with each other and 1 Unit below) • Architectural Drawing • Site Preparation Drafting • Project Presentation • Electronic Drafting • Project Simulation • Tool and Die Drafting • Advanced Structural Drafting
1 Unit	1 Unit — (Compatible with the two 1/2 unit courses elected above) Construction Drafting or Manufacturing Drafting

* The use of CAD as an instructional tool is recommended when this course is used as a part of the Four Unit Drafting Sequence.

COMPONENT DESCRIPTIONS

Introduction to Occupations (1 Unit): A program which is a required part of every Occupational Education sequence.

Technical Drawing (1/2 Unit): A Technology Education course which provides basic introductory instruction in drawing/drafting.

Computer-Aided Design (1/2 Unit): A Technology Education course which assists students to acquire a broad perspective of how "CAD" fits into the larger computer-aided processes of design, manufacturing, inventorying, marketing, databasing, and to acquire the basic skills in using computers in drawing/drafting and designing.

Design and Drawing for Production (1 Unit): An Art Education and Technology Education course which uses a common graphic language to describe forms in the man-made environment. Students analyze, creatively design, prepare drawings, and critically evaluate these objects.

Architectural Drawing (1/2 Unit): A Technology Education course which provides understanding and appreciation of architectural design and how it has changed through the ages, and an understanding of aesthetic judgement and ability to apply it to works of architecture.

Site Preparation Drafting (1/2 Unit): A course in the preparation of site, surveying, road and parking area, utilities, and landscape drawings.

Project Presentation Drawing (1/2 Unit): A course in the preparation of perspective, pictorial, and illustration drawings, and sketching and rendering in black and white and in color.

Electronic Drafting (1/2 Unit): A course in printed-circuit board and integrated circuit drafting.

Project Simulation (1/2 Unit): A course in the production of scale models and robotics, and computer-produced three-dimensional models and animation.

Tool and Die Drafting (1/2 Unit): A course in the production of detailed drawings of milling fixtures, drill jigs, and punch and die sets.

Structural Drafting (1/2 Unit): A course in the production of drawings of beams, columns, and trusses, utilizing all common construction materials.

Construction Drafting (1 Unit): A course in the production of foundation and floor plans, elevations, sections and detail drawings, schedules (e.g., doors/windows, finish, electrical, plumbing), and budget estimates for residential and "light commercial" construction (e.g., structural steel, prestressed concrete, HVAC, and other "commercial" details).

Manufacturing Drafting (1 Unit): A course in electro-mechanical drafting, including geometric dimensioning, gears and cams, welding, piping, fasteners and threads, castings, developments and intersections, sections and auxiliary views, layout drawings and electronic schematics.

THE BASIC ELEMENTS OF ART

In order to develop effectively a varied and diversified instructional program, it is necessary for the student to become familiar with the basic elements of art and to have understanding of the instructional materials utilized in the design process. The design activity, which treats specific instructional processes in relation to the media of expression, should be both helpful and practical in developing provocative problem activities.

Elements of Design

- Space
- Line
- Value
- Color
- Texture
- Shape
- Form
- Time
- Motion

Principles of Design

Unity
Harmony
Balance
Dominance
Rhythm
Repetition

Definition of Terms

Underlying all design activities are certain basic elements, an understanding of which is essential for effective expression. These elements—form, line, value, space, texture, color, time and motion—are the vocabulary with which we express our thinking and feeling through art media. Helping pupils to understand how the elements of art structure are utilized to organize creative experiences is only one way to develop design awareness. It is a step that usually *follows* rather than precedes the making of choices, the selection of media, and the arrangement of shapes. The elements of art are best learned when they are thought of as tools for analyzing and comprehending design experiences. They are best learned by being infused into the design activity. All of the elements of art are interrelated and should not be thought of as separate entities.

:A FILE - POSSIBLE DESIGN ACTIVITY BRIEFS

Following is a list of suggested topics to be used when developing design activity fs, this list is only a beginning "Idea File" to assist the teacher. Teachers should not tate to develop their own creative ideas that will expand this appendix.

Device to remove cooking rack from hot oven

LOGOS

Paper napkin holder for restaurant table

Folding brush, comb, and mirror set to fit into a pocket

Portable compact disc player

Watering device to provide measured amount to plants

Easy tie, quick release device to hold shoelaces together

Automobile steering wheels or wheel cover

A product that serves as a food container for a child's size hamburger and also as a child's toy

Planters for outside decks

A sidecar for a bicycle

An end table with a secret compartment to store valuables

An ice cream container that when being opened, will premeasure equal portions of ice cream

An exotic carrying cage for song birds

A telephone for the year 2050

A box for shipping one dozen fresh eggs through the postal system

A letterhead design

A three dimensional puzzle

An exterior automobile design for the twenty-first century

A carrying case for a fisherman's fly rod and reel

A garden cart

New York State Education Department
Albany, New York 12234

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