

2010 Mississippi Curriculum Framework

Postsecondary Drafting and Design Cluster

(Program CIP: 15.0101 – Architectural Engineering Technology/Technician)

(Program CIP: 15.1301 – General Drafting)

(Program CIP: 45.0702 – Geographical Information Systems Option)

(Program CIP: 15.1102 – Land Surveying Option)

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Standards in this document are based on information from the following organizations:

**American Design Drafting
Association Skill Standards**

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Drafting Association

Related Academic Standards

CTB/McGraw-Hill LLC. (2005). *Tests of adult basic
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Preface

Drafting and Design Research Synopsis

Drafters and design technologists provide drawings and plans used in construction and production. They provide visual guidelines to demonstrate the construction of a structure or product (U.S. Bureau of Labor Statistics, 2009). Drafters fill in technical details using drawings, rough sketches, specifications, and calculations made by engineers, surveyors, architects, or scientists. For example, many drafters use their knowledge of standardized building techniques to draw in the details of structures. Some use their understanding of engineering and manufacturing theory and standards to draw the parts of a machine; they determine design elements, such as the numbers and kinds of fasteners needed to assemble the machine (U.S. Bureau of Labor Statistics, 2009). Most drafters prepare plans and drawings with Computer Aided Design and Drafting (CADD) systems. Nevertheless, drafters and designers must be familiar with traditional drafting methods to be successful within the industry.

Articles, books, Web sites, and other materials listed at the end of each course were considered during the revision process. Specific journals and magazines were especially useful in providing insight into trends and issues in the field. These references are suggested for use by instructors and students during the study of the topics outlined. Industry advisory team members at colleges throughout the state were asked to give input related to changes to be made to the curriculum framework. Specific comments related to soft skills needed in this program include that course names should be updated to reflect current industry terminology and more technical electives should be added so colleges will have the flexibility to cater to industry and student needs.

Needs of the Future Workforce

There were over 318,000 drafters employed in the United States in 2009. Despite slower than average growth in the United States, 5%, Mississippi is projected to have slightly above average growth over the next 10 years, 15% (EMSI, 2009). Job prospects will be best for those with at least 2 years of postsecondary education (U.S. Bureau of Labor Statistics, 2009).

Drafting and Design Employment Projections and Earnings

Region	2009 Jobs	2019 Jobs	Change	% Change	Current Median Hourly Earnings
Regional Total	3,693	4,234	541	15%	\$21.30
National Total	318,621	334,977	16,356	5%	\$23.20

Source: EMSI Complete Employment - 4th Quarter 2009

Over half of all drafting jobs are with architectural engineering or other construction and engineering-related firms. Another 24% of drafters are employed in manufacturing. Compensation for workers in the drafting and design industry varies based on their specialty. There are multiple specialties within the drafting and design occupation. Aeronautical drafters prepare drawings and plans for aeronautic devices such as aircraft and missiles. Architectural drafters prepare plans and drawings for buildings and construction projects. Civil drafters prepare drawings and maps used in civil engineering and infrastructure design. Electrical drafters design plans and drawings detailing the layout and wiring diagrams used to repair and install

electric equipment. Electronics drafters draw wiring diagrams, circuit board assembly diagrams, schematics, and layout drawings used in the manufacture, installation, and repair of electronic devices and components. Mechanical drafters prepare drawings showing the detail and method of assembly of a wide variety of machinery and mechanical devices, indicating dimensions, fastening methods, and other requirements. Process piping or pipeline drafters prepare drawings used in the layout, construction, and operation of oil and gas fields, refineries, chemical plants, and process piping systems (U.S. Bureau of Labor Statistics, 2009).

Description	2009 Jobs	2019 Jobs	Current Median Hourly Earnings
Architectural and civil drafters	664	729	\$19.01
Electrical and electronics drafters	536	661	\$20.54
Mechanical drafters	1,414	1,589	\$15.85
Drafters, all other	233	284	\$22.08
Engineering technicians, except drafters, all other	846	970	\$32.48
Total	3,693	4,234	\$21.30

Source: EMSI Complete Employment - 4th Quarter 2009

Curriculum

The following national standards were referenced in each course of the curriculum:

- CTB/McGraw-Hill LLC *Tests of Adult Basic Education, Forms 7 and 8 Academic Standards OR* Mississippi Department of Education Subject Area Testing Program Academic Standards
- 21st Century Skills
- American Design Drafting Association Skill Set Standards

Industry and instructor comments, along with current research, were considered by the curriculum revision team during the revision process; and changes were made as needed and appropriate. Many of the skills and topics noted in the research were already included in the curriculum framework. Specific changes made to the curriculum at the February, 2010 curriculum revision meeting include the following:

- Competencies and objectives were reviewed to ensure accuracy and appropriateness.
- Competencies and objectives related to the revised standards were added or changed.
- The references list was updated.
- The Recommended Tools and Equipment list was updated.
- Fundamentals of Drafting (DDT 1113) was changed from 4 to 3 scheduled credit hours.
- A new Land Surveying Option was added to the curriculum.
- Architectural Design II (DDT 2623) is now a pre/corequisite for Fundamentals of Multimedia (DDT 2713).

Assessment

Students will be assessed using the MS-CPAS2 Drafting and Design test.

Professional Learning

It is suggested that instructors participate in professional learning related to the following concepts:

- New topics in curriculum and new standards
- Topics where instructors need help
- How to use the program Blackboard site
- Differentiated instruction – To learn more about differentiated instruction, please go to http://www.paec.org/teacher2teacher/additional_subjects.html and click on Differentiated Instruction. Work through this online course, and review the additional resources.

Articulation

Articulation credit from Secondary General Drafting to Postsecondary Drafting and Design Cluster will be awarded upon implementation of this curriculum by the college. The course to be articulated is Fundamentals of Drafting (DDT 1113) with the stipulation of passing the MS-CPAS2 according to State Board for Community and Junior Colleges (SBCJC) guidelines.

Articulated Secondary Course	Articulated Postsecondary Course
General Drafting (CIP: 15.1301)	DDT 1113 - Fundamentals of Drafting

Statewide Guidelines on Articulated Credit

Eligibility

- To be eligible for articulated credit, a student must do the following:
 - Complete the articulated Secondary Vocational Program; and
 - Score 80% or higher on the Mississippi Career Planning and Assessment System, Second Edition (MS-CPAS2) in the secondary program of study.
- To be awarded articulated credit, a student must do the following:
 - Complete application for articulated credit at the community or junior college;
 - Enroll in the community or junior college within 12 months of graduation; and
 - Successfully complete 12 non-developmental career–technical or academic credit hours in the corresponding articulated postsecondary career–technical program of study.

How MS-CPAS2 will be documented

- The Research and Curriculum Unit of Mississippi State University will provide the SBCJC a list of all secondary career and technical education (CTE) students scoring at or above the 80th percentile for the articulated programs.
- The SBCJC will forward the list of students eligible for articulated credit to the colleges.

Transcripting of articulated credit

- Students must complete 12 non-developmental career–technical or academic credit hours in the articulated postsecondary career–technical program of study before the articulated credit is transcripted.
- No grade will be given on the transcript for articulated courses; only hours granted will be transcripted (thus resulting in no change in quality points).

Time limit

- MS-CPAS2 scores will be accepted to demonstrate competencies for up to 12 months after high school graduation.

Cost

- No costs will be assessed on hours earned through articulated credit.

Foreword

As the world economy continues to evolve, businesses and industries must adopt new practices and processes in order to survive. Quality and cost control, work teams and participatory management, and an infusion of technology are transforming the way people work and do business. Employees are now expected to read, write, and communicate effectively; think creatively, solve problems, and make decisions; and interact with each other and the technologies in the workplace. Vocational–technical programs must also adopt these practices in order to provide graduates who can enter and advance in the changing work world.

The curriculum framework in this document reflects these changes in the workplace and a number of other factors that impact local vocational–technical programs. Federal and state legislation calls for articulation between high school and community college programs, integration of academic and vocational skills, and the development of sequential courses of study that provide students with the optimum educational path for achieving successful employment. National skills standards, developed by industry groups and sponsored by the U.S. Department of Education and Labor, provide vocational educators with the expectations of employers across the United States. All of these factors are reflected in the framework found in this document.

Referenced throughout the courses of the curriculum are the 21st Century Skills, which were developed by the Partnership for 21st Century Skills, a group of business and education organizations concerned about the gap between the knowledge and skills learned in school and those needed in communities and the workplace. A portion of the 21st Century Skills addresses learning skills needed in the 21st century, including information and communication skills, thinking and problem-solving skills, and interpersonal and self-directional skills. The need for these types of skills has been recognized for some time, and the 21st Century Skills are adapted in part from the 1991 report from the U.S. Secretary of Labor’s Commission on Achieving Necessary Skills (SCANS). Another important aspect of learning and working in the 21st century involves technology skills, and the International Society for Technology in Education, developer of the National Educational Technology Standards (NETS), was a strategic partner in the Partnership for 21st Century Skills.

Each postsecondary program of instruction consists of a program description and a suggested sequence of courses that focus on the development of occupational competencies. Each vocational–technical course in this sequence has been written using a common format, which includes the following components:

- Course Name – A common name that will be used by all community and junior colleges in reporting students
- Course Abbreviation – A common abbreviation that will be used by all community and junior colleges in reporting students
- Classification – Courses may be classified as the following:
 - Vocational–technical core – A required vocational–technical course for all students

- Area of concentration (AOC) core – A course required in an area of concentration of a cluster of programs
 - Vocational–technical elective – An elective vocational–technical course
 - Related academic course – An academic course that provides academic skills and knowledge directly related to the program area
 - Academic core – An academic course that is required as part of the requirements for an associate’s degree
- Description – A short narrative that includes the major purpose(s) of the course and the recommended number of hours of lecture and laboratory activities to be conducted each week during a regular semester
 - Prerequisites – A listing of any courses that must be taken prior to or on enrollment in the course
 - Corequisites – A listing of courses that may be taken while enrolled in the course
 - Competencies and Suggested Objectives – A listing of the competencies (major concepts and performances) and of the suggested student objectives that will enable students to demonstrate mastery of these competencies

The following guidelines were used in developing the program(s) in this document and should be considered in compiling and revising course syllabi and daily lesson plans at the local level:

- The content of the courses in this document reflects approximately 75% of the time allocated to each course. The remaining 25% of each course should be developed at the local district level and may reflect the following:
 - Additional competencies and objectives within the course related to topics not found in the state framework, including activities related to specific needs of industries in the community college district
 - Activities that develop a higher level of mastery on the existing competencies and suggested objectives
 - Activities and instruction related to new technologies and concepts that were not prevalent at the time the current framework was developed or revised
 - Activities that implement components of the Mississippi Tech Prep initiative, including integration of academic and vocational–technical skills and course work, school-to-work transition activities, and articulation of secondary and postsecondary vocational–technical programs
 - Individualized learning activities, including work-site learning activities, to better prepare individuals in the courses for their chosen occupational areas
- Sequencing of the course within a program is left to the discretion of the local district. Naturally, foundation courses related to topics such as safety, tool and equipment usage, and other fundamental skills should be taught first. Other courses related to specific skill areas and related academics, however, may be sequenced to take advantage of seasonal and climatic conditions, resources located outside of the school, and other factors.

- Programs that offer an Associate of Applied Science degree must include a minimum 15-semester-credit-hour academic core. Specific courses to be taken within this core are to be determined by the local district. Minimum academic core courses are as follows:
 - 3 semester credit hours Mathematics/Science Elective
 - 3 semester credit hours Written Communications Elective
 - 3 semester credit hours Oral Communications Elective
 - 3 semester credit hours Humanities/Fine Arts Elective
 - 3 semester credit hours Social/Behavioral Science Elective

It is recommended that courses in the academic core be spaced out over the entire length of the program so that students complete some academic and vocational–technical courses each semester. Each community or junior college has the discretion to select the actual courses that are required to meet this academic core requirement.

- In instances in which secondary programs are directly related to community and junior college programs, competencies and suggested objectives from the high school programs are listed as baseline competencies. These competencies and objectives reflect skills and knowledge that are directly related to the community and junior college vocational–technical program. In adopting the curriculum framework, each community or junior college is asked to give assurances that:
 - Students who can demonstrate mastery of the baseline competencies do not receive duplicate instruction, and
 - Students who cannot demonstrate mastery of this content will be given the opportunity to do so.
- The roles of the baseline competencies are to:
 - Assist community and junior college personnel in developing articulation agreements with high schools, and
 - Ensure that all community and junior college courses provide a higher level of instruction than their secondary counterparts.
- The baseline competencies may be taught as special introduction courses for 3 to 6 semester hours of institutional credit, which will not count toward associate degree requirements. Community and junior colleges may choose to integrate the baseline competencies into ongoing courses in lieu of offering the introduction courses or may offer the competencies through special projects or individualized instruction methods.
- Technical elective courses have been included to allow community colleges and students to customize programs to meet the needs of industries and employers in their area.

In order to provide flexibility within the districts, individual courses within a framework may be customized by doing the following:

- Adding new competencies and suggested objectives
- Revising or extending the suggested objectives for individual competencies
- Integrating baseline competencies from associated high school programs

- Adjusting the semester credit hours of a course to be up 1 hour or down 1 hour (after informing the SBCJC of the change)

In addition, the curriculum framework as a whole may be customized by doing the following:

- Resequencing courses within the suggested course sequence
- Developing and adding a new course that meets specific needs of industries and other clients in the community or junior college district (with SBCJC approval)
- Utilizing the technical elective options in many of the curricula to customize programs

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Program Description

The Drafting and Design Technology programs of study are designed to provide specialized occupational instruction in all phases of drafting technology in order to prepare students for positions in the drafting field. A combination of class work and laboratory experience is stressed.

Successful completion of a minimum of 64 semester credit hours of course work in a 2-year program leads to an Associate in Applied Science degree. Students who successfully complete a minimum of 46 semester hours in drafting and design technology courses may earn a vocational certificate in general drafting.

The Drafting and Design Cluster curricula allow students to obtain skills and knowledge related to several fields of the drafting and design industry. Options within the curriculum framework include General Drafting, Land Surveying, and Geographical Information Systems Technology. The Architectural Engineering Technology curriculum provides students with specialized skills in the architectural drafting and design field.

The content of this curriculum framework is based on national standards as developed by the American Design and Drafting Association.

Industry standards are based on the American Design Drafting Association Skill Standards.

Suggested Course Sequence*
Drafting and Design Technology
Architectural Engineering Technology/Technician

Associate's Degree

FIRST YEAR

3 sch Fundamentals of Drafting (DDT 1113)	3 sch Architectural Design I (DDT 1613)
3 sch Construction Materials (DDT 1213)	3 sch Intermediate CAD (DDT 1323)
3 sch Principles of CAD (DDT 1313)	3 sch Elective
3 sch Written Communications Elective	3 sch Oral Communications Elective
3 sch Mathematics/Science Elective	3 sch Restrictive Elective**
15 sch	15 sch

SECOND YEAR

3 sch Cost Estimating (DDT 2243)	3 sch Structural Drafting I (DDT 2213)
3 sch Advanced CAD (DDT 2343)	3 sch Civil Drafting (DDT 2153)****
6 sch Technical Electives****	3 sch Architectural Design II (DDT 2623)
3 sch Social/Behavioral Science Elective	3 sch Restrictive Elective**
3 sch Humanities/Fine Arts Elective	3 sch Technical Electives****
18 sch	15 sch

* Students who lack entry-level skills in mathematics, English, science, and so forth will be provided related studies.

** Restrictive elective includes mathematics, science, or technology.

*** Elementary Surveying (DDT 1413) and Mapping and Topography (DDT 2423) may be taken in lieu of Civil Drafting (DDT 2153).

****ELECTIVES - ARCHITECTURAL ENGINEERING TECHNOLOGY

3 sch	Science and Technology (ATE 1113)
3 sch	Computational Methods for Drafting (DDT 1123)
3 sch	Database Construction and Maintenance (GIT 2113)
3 sch	Fundamentals of Geographical Information Systems (GIS) (GIT 2123)
3 sch	Principles of Image Processing (GIT 2133)
3 sch	Advanced Geographical Information Systems (GIT 2263)
3 sch	Remote Sensing (GIT 2273)
3 sch	Geometric Dimensioning and Tolerancing (DDT 1143)
3 sch	Descriptive Geometry (DDT 1153)
3 sch	Statics and Strength of Materials (DDT 2253)
3 sch	CAD Management (DDT 2353)
3 sch	Machine Drafting I (DDT 1133)
3 sch	Elementary Surveying (DDT 1413)
3 sch	Facilities Planning (DDT 2273)
3 sch	Structural Drafting II (DDT 2233)
3 sch	Mapping and Topography (DDT 2423)
3 sch	Legal Principles of Surveying (CIT 2113/DDT 2433)
3 sch	Advanced Surveying (CIT 2124/DDT 2443)
3 sch	GPS Surveying (CIT 2444/DDT 2463)
3 sch	Pipe Drafting (DDT 2523)
3 sch	Highway Drafting (DDT 2533)
3 sch	Fundamentals of Multimedia (DDT 2713)
1-3 sch	Special Project [DDT 291(1-3)]
1-6 sch	Supervised Work Experience in Drafting and Design Technology [DDT 292(1-6)]
1-3 sch	Work-Based Learning I, II, III, IV, V, and VI [(WBL 191(1-3), WBL 192(1-3), WBL 193(1-3), WBL 291(1-3), WBL 292(1-3), WBL 293(1-3)]

Note: Any other technical or academic course as approved by the instructor

Suggested Course Sequence*
Drafting and Design Technology
General Drafting

Associate's Degree

FIRST YEAR

3 sch Fundamentals of Drafting (DDT 1113) 3 sch Restrictive Elective** 3 sch Principles of CAD (DDT 1313) 3 sch Written Communications Elective 3 sch Mathematics/Science Elective <hr style="width: 100%;"/> 15 sch	3 sch Machine Drafting I (DDT 1133) 3 sch Intermediate CAD (DDT 1323) 3 sch Construction Materials (DDT 1213) 3 sch Oral Communications Elective 3 sch Elective <hr style="width: 100%;"/> 15 sch
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SECOND YEAR

3 sch Architectural Design I (DDT 1613) 3 sch Advanced CAD (DDT 2343) 3 sch Technical Electives**** 3 sch Humanities/Fine Arts Elective 3 sch Social/Behavioral Science Elective <hr style="width: 100%;"/> 15 sch	3 sch Structural Drafting I (DDT 2213) 3 sch Civil Drafting (DDT 2153)*** 9 sch Technical Electives**** 3 sch Restrictive Elective** <hr style="width: 100%;"/> 18 sch
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* Students who lack entry-level skills in mathematics, English, science, and so forth will be provided related studies.

** Restrictive elective includes mathematics, science, or technology.

*** Elementary Surveying (DDT 1413) and Mapping and Topography (DDT 2423) may be taken in lieu of Civil Drafting (DDT 2153).

***ELECTIVES - GENERAL DRAFTING

3 sch	Blueprint Reading I (DDT 1513)
3 sch	Blueprint Reading II (DDT 1523)
3 sch	Computational Methods for Drafting (DDT 1123)
3 sch	Science and Technology (ATE 1113)
3 sch	Database Construction and Maintenance (GIT 2113)
3 sch	Fundamentals of Geographical Information Systems (GIS) (GIT 2123)
3 sch	Principles of Image Processing (GIT 2133)
3 sch	Advanced Geographical Information Systems (GIT 2263)
3 sch	Remote Sensing (GIT 2273)
3 sch	Geometric Dimensioning and Tolerancing (DDT 1143)
3 sch	Descriptive Geometry (DDT 1153)
3 sch	Fundamentals of Machining Processes (DDT 1713)
3 sch	Elementary Surveying (DDT 1413)
3 sch	Design for Manufacturing (DDT 1813)
3 sch	Machine Drafting II (DDT 2163)
3 sch	Structural Drafting II (DDT 2233)
3 sch	Cost Estimating (DDT 2243)
3 sch	Statics and Strength of Materials (DDT 2253)
3 sch	Quality Assurance (DDT 2263)
3 sch	Computer Numerical Control (CNC) Drafting (DDT 2363)
3 sch	Mapping and Topography (DDT 2423)
3 sch	Legal Principles of Surveying (CIT 2113/DDT 2433)
3 sch	Advanced Surveying (CIT 2124/DDT 2443)
3 sch	GPS Surveying (CIT 2444/DDT 2463)
3 sch	Pipe Drafting (DDT 2523)
3 sch	CAD Management (DDT 2353)
3 sch	Highway Drafting (DDT 2533)
3 sch	Steel Ship Building and Design (DDT 2543)
3 sch	Architectural Design II (DDT 2623)
3 sch	Fundamentals of Multimedia (DDT 2713)
1–3 sch	Special Project [DDT 291(1–3)]
1–6 sch	Supervised Work Experience in Drafting and Design Technology [DDT 292(1–6)]
1–3 sch	Work-Based Learning I, II, III, IV, V, and VI [WBL 191(1–3), WBL 192(1–3), WBL 193(1–3), WBL 291(1–3), WBL 292(1–3), WBL 293(1–3)]

Note: Any other technical or academic course as approved by the instructor

Program Description

Land Surveying Option

This program prepares a person for careers in the land-surveying field such as a Professional Land Surveyor, CAD Technician, and Survey Technician. Emphasis is placed on the use of modern survey equipment, drafting software, and the fundamentals and principles of land surveying. Upon successful completion of the curriculum, the graduate will earn an Associate of Applied Science Degree (AAS) and is eligible to pursue a Professional Land Surveyor License in the state of Mississippi. This program will also prepare a student for the Certified Survey Technician (CST) program sponsored by the National Society of Professional Land Surveyors (NSPS). A minimum of 61 semester credit hours is required to receive the Associate of Applied Science Degree in Drafting and Design with an emphasis in Land Surveying.

Suggested Course Sequence*
Drafting and Design Technology
Land Surveying

Associate's Degree

FIRST YEAR

3 sch Fundamentals of Drafting (DDT 1113) 3 sch Principles of CAD (DDT 1313) 3 sch Fundamentals of Microcomputer Applications (CPT 1113) 3 sch English Composition I (ENG 1113) 3 sch College Algebra (MAT 1313)	3 sch Intermediate CAD (DDT 1323) 3 sch Elementary Surveying (DDT 1413) 3 sch Trigonometry (MAT 1213) 3 sch Public Speaking I (SPT 1113) 3 sch English Composition II (ENG 1123)
15 sch	15 sch

SECOND YEAR

4 sch General Physics I with Lab (PHY 2414) 3–4sch Advanced Surveying (CIT 2124/DDT 2443) 3 sch Calculus I (MAT 1613) or Statistics I (MAT 2323) 3 sch Humanities/Fine Arts Elective** 3 sch Approved Elective***	4 sch General Physics II with Lab (PHY 2424) 3 sch Legal Principles of Surveying (CIT 2113/DDT 2433) 3 sch Mapping and Topography (DDT 2423) 3 sch Social/Behavioral Science Elective** 3 sch Approved Elective***
16–17 sch	16 sch

* Students who lack entry-level skills in mathematics, English, science, and so forth will be provided related studies.

** As approved by the instructor

*** As approved by the instructor; however, recommended courses include the following:

ACC 1213 Principles of Accounting I
ACC 1223 Principles of Accounting II
BAD 1113 Introduction to Business
BAD 2413 Legal Environment of Business I
BAD 2423 Legal Environment of Business II
BAD 2723 Real Estate law
PHY 1113 Introduction to Astronomy

Suggested Course Sequence*
Drafting and Design Technology
General Drafting

Certificate

FIRST SEMESTER

3 sch Fundamentals of Drafting (DDT
1113)
 3 sch Principles of CAD (DDT 1313)
 3 sch Machine Drafting I (DDT 1133)
 3 sch Elementary Surveying (DDT 1413)
 3 sch Technical Elective***

15 sch

SECOND SEMESTER

3 sch Machine Drafting II (DDT 2163)
 3 sch Architectural Design I (DDT 1613)
 3 sch Intermediate CAD (DDT 1323)
 3 sch Civil Drafting (DDT 2153)**
 3 sch Technical Elective***

15 sch

THIRD SEMESTER

3 sch Architectural Design II (DDT 2623)
 3 sch Advanced CAD (DDT 2343)
 3 sch Special Project (DDT 2913)
 6 sch Technical Electives***

15 sch

* Students who lack entry-level skills in mathematics, English, science, and so forth will be provided related studies.

** Elementary Surveying (DDT 1413) and Mapping and Topography (DDT 2423) may be taken in lieu of Civil Drafting (DDT 2153).

***ELECTIVES - VOCATIONAL CERTIFICATE

3 sch	Blueprint Reading I (DDT 1513)
3 sch	Blueprint Reading II (DDT 1523)
3 sch	Computational Methods for Drafting (DDT 1123)
3 sch	Geometric Dimensioning and Tolerancing (DDT 1143)
3 sch	Descriptive Geometry (DDT 1153)
3 sch	Construction Materials (DDT 1213)
3 sch	Fundamentals of Machining Processes (DDT 1713)
3 sch	Design for Manufacturing (DDT 1813)
3 sch	CAD Management (DDT 2353)
3 sch	Legal Principles of Surveying (CIT 2113/DDT 2433)
3 sch	Advanced Surveying (CIT 2124/DDT 2443)
3 sch	GPS Surveying (CIT 2444/DDT 2463)
3 sch	Structural Drafting I (DDT 2213)
3 sch	Cost Estimating (DDT 2243)
3 sch	Statics and Strength of Materials (DDT 2253)
3 sch	Mapping and Topography (DDT 2423)
3 sch	Pipe Drafting (DDT 2523)
3 sch	Highway Drafting (DDT 2533)
3 sch	Steel Ship Building and Design (DDT 2543)
3 sch	Fundamentals of Multimedia (DDT 2713)
1-6 sch	Supervised Work Experience in Drafting and Design Technology [DDT 292(1-6)]
1-3 sch	Work-Based Learning I, II, III, IV, V, and VI [(WBL 191(1-3), WBL 192(1-3), WBL 193(1-3), WBL 291(1-3), WBL 292(1-3), WBL 293(1-3)]

Note: Any other technical or academic course as approved by the instructor

Program Description

Geographical Information Systems Technology Option

This program prepares a person for entry-level positions in the geographical information systems field. A geographical information system (GIS) is an integrated database management system used to store, organize, retrieve, and analyze geographical and resource data for decision making. The curriculum includes computer-assisted drafting, map making, database management, surveying, and applications of geographical information systems. GIS technicians work under the supervision of GIS engineers, managers, cartographers, surveyors, and other professionals to store, organize, retrieve, and analyze resource data for planning and decision making. The need for technicians in this area continues to grow with the rapid development and implementation of GIS technology. A minimum of 64 semester credit hours is required to receive the Associate of Applied Science Degree in Geographical Information Systems Technology. Students who complete a minimum of 34 semester hours in the program may be eligible to receive a certificate in Geographical Information Systems.

Suggested Course Sequence*
Drafting and Design Technology
Geographical Information Systems Technology

Certificate

A Certificate of Geographical Information Systems may be awarded to a student who successfully completes the 33 semester credit hours of required courses.

FIRST YEAR

3 sch Elementary Surveying (DDT 1413) 3 sch Database Construction and Maintenance (GIT 2113) 3 sch Fundamentals of Drafting (DDT 1113) 3 sch Fundamentals of Geographical Information Systems (GIS) (GIT 2123) 3 sch Principles of CAD (DDT 1313)	3 sch Advanced Geographical Information Systems (GIT 2263) 3 sch Cartography and Computer Map Reading (GIT 1253) 3 sch Mapping and Topography for GIS (GIT 2423)** 3 sch Remote Sensing (GIT 2273) 6 sch Technical Electives***
15 sch	18 sch

* Students who lack entry-level skills in mathematics, English, science, and so forth will be provided related studies.

** Mapping and Topography (DDT 2423) may be taken in lieu of Mapping and Topography for GIS (GIT 2423).

*****APPROVED ELECTIVES**

3 sch Principles of Image Processing (GIT 2133)
3 sch Intermediate CAD (DDT 1323)
3 sch Advanced CAD (DDT 2343)
3 sch Advanced Surveying (CIT 2124/DDT 2443)
3 sch GPS Surveying (CIT 2444/DDT 2463)

- 1–3 sch Special Problem in Geographical Information Systems Technology [GIT 291(1–3)]
- 1–6 sch Supervised Work Experience in Geographical Information Systems Technology [GIT 292(1–6)]
- 1–3 sch Work-Based Learning I, II, III, IV, V, and VI [WBL 191(1–3), WBL 192(1–3), WBL 193(1–3), WBL 291(1–3), WBL 292(1–3), WBL 293(1–3)]

Note: Any other technical or academic course as approved by the instructor

Suggested Course Sequence*
Drafting and Design Technology
Geographical Information Systems Technology

Associate's Degree

FIRST YEAR

3 sch Elementary Surveying (DDT 1413)	3 sch Descriptive Geometry (DDT 1153)
3 sch Fundamentals of Drafting (DDT 1113)	3 sch GPS Surveying (CIT 2444/DDT 2463)
3 sch Principles of CAD (DDT 1313)	3 sch Technical Elective**
3 sch Mathematics/Science Elective	3 sch Approved Geography Course
3 sch Written Communications Elective	3 sch Oral Communications Elective
15 sch	15 sch

SECOND YEAR

3 sch Fundamentals of Geographical Information Systems (GIS) (GIT 2123)	3 sch Advanced Geographical Information Systems (GIT 2263)
3 sch Remote Sensing (GIT 2273)	3 sch Approved Course in Geography or Geology
3 sch Cartography and Computer Map Reading (GIT 1253)	3 sch Principles of Image Processing (GIT 2133)
3 sch Database Construction and Maintenance (GIT 2113)	3 sch Technical Elective**
3 sch Technical Elective***	3 sch Social/Behavioral Science
3 sch Humanities/Fine Arts Elective	15 sch
18 sch	

* Students who lack entry-level skills in mathematics, English, science, and so forth will be provided related studies.

TECHNICAL ELECTIVES*

- 3 sch Science and Technology (ATE 1113)
- 3 sch Intermediate CAD (DDT 1323)
- 3 sch Advanced CAD (DDT 2343)
- 3 sch Advanced Surveying (CIT 2124/DDT 2443)
- 3 sch Visual Basic Programming Language (CPT 1214)
- 3 sch Trigonometry (MAT 1323)
- 3 sch Mapping and Topography for GIS (GIT 2423) or Mapping and Topography (DDT 2423)
- 1–3 sch Special Problem in Geographical Information Systems Technology [GIT 291(1–3)]
- 1–6 sch Supervised Work Experience in Geographical Information Systems Technology [GIT 292(1–6)]
- 1–3 sch Work-Based Learning I, II, III, IV, V, and VI [WBL 191(1–3), WBL 192(1–3), WBL 193(1–3), WBL 291(1–3), WBL 292(1–3), WBL 293(1–3)]

*Note: Any other technical or academic course as approved by the instructor

Architectural Engineering Technology and General Drafting Courses

Course Name: Fundamentals of Drafting

Course Abbreviation: DDT 1113

Classification: Vocational–Technical Core

Description: Fundamentals and principles of drafting to provide the basic background needed for all other drafting courses (3 sch: 2-hr lecture, 2-hr lab)

Pre/Corequisites: None

Competencies and Suggested Objectives	
1.	Discuss classroom procedures and drafting occupations. ^{DDST1, DDS6} a. Describe proper classroom/lab procedures. ^(DOK1) b. Describe the various occupations in drafting and their requirements. ^(DOK1)
2.	Explain and apply safety rules and regulations. ^{DDST1, DDS6} a. Describe safety rules for drafting occupations. ^(DOK1) b. List and discuss hazardous materials found in the drafting area. ^(DOK1)
3.	Apply proper techniques in technical drawings. ^{DDST1, DDS6} a. Demonstrate the ability to scale drawings. ^(DOK2) b. Construct various angles. ^(DOK2) c. Recognize and construct the alphabet of lines. ^(DOK2)
4.	Sketch and develop views of basic shapes. ^{DDST1, DDS2, DDS5, DDS6, DDS8} a. Develop a pictorial view from three principal views. ^(DOK2) b. Develop three principal views from a pictorial view. ^(DOK2) c. Complete three principal views when lines are missing. ^(DOK2)
5.	Use geometric constructions. ^{DDST1, DDS6, DDS10} a. Construct tangent arcs and lines. ^(DOK2) b. Divide lines or arcs into equal and/or proportional parts. ^(DOK2) c. Develop geometric shapes. ^(DOK2)
6.	Construct orthographic projections. ^{DDST1, DDS2, DDS5, DDS6} a. Construct a top view, with front and right side views given. ^(DOK2) b. Construct a front view, with top and right side views given. ^(DOK2) c. Construct a right side view, with top and front views given. ^(DOK2) d. Develop a drawing consisting of three principal views.
7.	Dimension objects. ^{DDST1, DDS2, DDS3, DDS6, DDS10} a. Recognize lines, symbols, features, and conventions used in dimensioning. ^(DOK1) b. Recognize and use size and location dimensions. ^(DOK2) c. Recognize and use general and local notes. ^(DOK2) d. Dimension a drawing using contour, chain, and baseline dimensioning. ^(DOK2)
8.	Construct sectional views. ^{DDST1, DDS2, DDS4, DDS5, DDS6} a. Construct full and half sectional views. ^(DOK2) b. Recognize and construct removed, revolved, offset, and aligned sectional views. ^(DOK2)

STANDARDS

American Design Drafting Association Skills Design Standards

DDS1	General Drafting Terminology
DDS2	View Identification
DDS3	Dimensioning Standards and Terminology
DDS5	Orthographic Projections Standards and Terminology
DDS6	General Drafting Standards
DDS8	Pictorial View Standards and Terminology
DDS10	Computer/CADD Terminology

Related Academic Standards

R1	Interpret Graphic Information (forms, maps, reference sources)
R2	Words in Context (same and opposite meaning)
R3	Recall Information (details, sequence)
R4	Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5	Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
M1	Addition of Whole Numbers (no regrouping, regrouping)
M2	Subtraction of Whole Numbers (no regrouping, regrouping)
M3	Multiplication of Whole Numbers (no regrouping, regrouping)
M4	Division of Whole Numbers (no remainder, remainder)
M5	Decimals (addition, subtraction, multiplication, division)
M6	Fractions (addition, subtraction, multiplication, division)
M7	Integers (addition, subtraction, multiplication, division)
M8	Percents
M9	Algebraic Operations
A1	Numeration (ordering, place value, scientific notation)
A2	Number Theory (ratio, proportion)
A3	Data Interpretation (graph, table, chart, diagram)
A4	Pre-Algebra and Algebra (equations, inequality)
A5	Measurement (money, time, temperature, length, area, volume)
A6	Geometry (angles, Pythagorean theory)
A7	Computation in Context (whole numbers, decimals, fractions, algebraic operations)
A8	Estimation (rounding, estimation)
L1	Usage (pronoun, tense, subject-verb agreement, adjective, adverb)
L2	Sentence Formation (fragments, run-on, clarity)
L3	Paragraph Development (topic sentence, supporting sentence, sequence)
L4	Capitalization (proper noun, titles)
L5	Punctuation (comma, semicolon)
L6	Writing Conventions (quotation marks, apostrophe, parts of a letter)
S1	Vowel (short, long)
S2	Consonant (variant spelling, silent letter)
S3	Structural Unit (root, suffix)

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21st Century Skills

- CS1 Global Awareness
- CS2 Financial, Economic, Business, and Entrepreneurial Literacy
- CS4 Health Literacy
- CS5 Environmental Literacy
- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration
- CS9 Information Literacy
- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS14 Social and Cross-Cultural Skills
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

SUGGESTED REFERENCES

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Hearlhy and Company. (2000). *Engineering drawing instructional video series* [Videotape]. (Available from Hearlhy and Company, P.O. Box 869, Springfield, OH 45501)

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Insight Media. (2000). *Engineering drawing series* [Videotape]. (Available from Insight Media, 2162 Broadway, New York, NY 10024-0621)

Course Name: Computational Methods for Drafting

Course Abbreviation: DDT 1123

Classification: Vocational–Technical Elective (Architectural Engineering Technology/Technician; General Drafting)

Description: Study of computational skills required for the development of accurate design and drafting methods (3 sch: 2-hr lecture, 2-hr lab)

Pre/Corequisites: None

Competencies and Suggested Objectives	
1. Demonstrate various measurement methods. ^{DDS3, DDS6}	
a. Measure distances, including metric and English measurements. ^(DOK1)	
b. Measure angles, including decimal degrees and degrees, minutes, and seconds. ^(DOK1)	
2. Apply industry data. ^{DDS6}	
a. Interpret graphs and charts. ^(DOK2)	
b. Manipulate gathered information. ^(DOK2)	
3. Analyze complex geometric shapes. ^{DDS1, DDS3, DDS6}	
a. Calculate area using metric and English systems. ^(DOK2)	
b. Calculate volume using metric and English systems. ^(DOK2)	
c. Solve geometric construction based on area/volume solutions. ^(DOK2)	
4. Calculate trigometric values. ^{DDS3, DDS6}	
a. Calculate angle values of a triangle. ^(DOK2)	
b. Solve geometric construction based on angular solutions. ^(DOK2)	
5. Calculate industry expenses. ^{DDS1, DDS3, DDS5, DDS6}	
a. Prepare a cost analysis. ^(DOK2)	
b. Compute overhead expenses. ^(DOK2)	
6. General mathematics. ^{DDS1, DDS6}	
a. Use a calculator. ^(DOK1)	
b. Solve basic algebraic equations and conversions from fraction to decimal and metric. ^(DOK2)	

STANDARDS

American Design Drafting Association Skills Design Standards

DDS1	General Drafting Terminology
DDS3	Dimensioning Standards and Terminology
DDS5	Orthographic Projections Standards and Terminology
DDS6	General Drafting Standards

Related Academic Standards

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
- M1 Addition of Whole Numbers (no regrouping, regrouping)
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- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
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- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
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21st Century Skills

- CS1 Global Awareness
- CS2 Financial, Economic, Business, and Entrepreneurial Literacy
- CS5 Environmental Literacy
- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration
- CS9 Information Literacy
- CS12 Flexibility and Adaptability

- CS13 Initiative and Self-Direction
- CS14 Social and Cross-Cultural Skills
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

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- Webster, A., & Judy, K. (2002). *Mathematics for carpentry and the construction trades*. Upper Saddle River, NJ: Pearson Prentice Hall.

Course Name: Machine Drafting I

Course Abbreviation: DDT 1133

Classification: Vocational–Technical Core (General Drafting Associate’s Degree and Certificate); Vocational–Technical Elective (Architectural Engineering Technology/Technician)

Description: Emphasizes methods, techniques, and procedures in presenting screws, bolts, rivets, springs, thread types, symbols for welding, materials, finish and heat treatment notation, working order preparation, routing, and other drafting room procedures (3 sch: 1-hr lecture, 4-hr lab)

Pre/Corequisites: Fundamentals of Drafting (DDT 1113) and Principles of CAD (DDT 1313)

Competencies and Suggested Objectives	
1. Discuss and identify basic machining processes.	DDS1, DDS6, DDS7
a. Define machining terminology.	(DOK1)
b. Recognize basic machining symbols.	(DOK1)
c. Identify basic manufacturing machines and tools.	(DOK1)
2. Create drawings of fasteners.	DDS1, DDS3, DDS5, DDS6, DDS10
a. Construct a drawing of fasteners from written descriptions and sketches.	(DOK2)
b. Represent different types and shapes of fasteners by following standard tables as to sizes, fits, and dimensions.	(DOK2)
c. Apply geometric dimensioning and tolerancing (GD&T).	(DOK2)
3. Prepare drawings for production.	DDS1, DDS2, DDS3, DDS4, DDS5, DDS6, DDS7, DDS8, DDS9, DDS10
a. Label a set of drawings with parts list, title block information, and drawing numbers.	(DOK2)
b. Create detailed drawings involving cams, gears, and pulleys from sketches and written descriptions.	(DOK2)
4. Prepare welding drawings.	DDS1, DDS2, DDS3, DDS4, DDS5, DDS6, DDS7, DDS8, DDS9, DDS10
a. Identify the welding symbols used on welding prints.	(DOK1)
b. Create a drawing that will represent joint types, weld types, and welding symbols, using standard welding symbols.	(DOK2)

STANDARDS

American Design Drafting Association Skills Design Standards

DDS1	General Drafting Terminology
DDS2	View Identification
DDS3	Dimensioning Standards and Terminology
DDS4	Sections View Standards and Terminology
DDS5	Orthographic Projections Standards and Terminology
DDS6	General Drafting Standards
DDS7	Manufacturing Processes and Welding
DDS8	Pictorial View Standards and Terminology

DDS9 Auxiliary View Standards, Definitions, and Terminology
 DDS10 Computer/CADD Terminology

Related Academic Standards

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
- M1 Addition of Whole Numbers (no regrouping, regrouping)
- M2 Subtraction of Whole Numbers (no regrouping, regrouping)
- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

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21st Century Skills

- CS1 Global Awareness
- CS4 Health Literacy
- CS5 Environmental Literacy
- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving

CS8 Communication and Collaboration
CS9 Information Literacy
CS12 Flexibility and Adaptability
CS13 Initiative and Self-Direction
CS15 Productivity and Accountability
CS16 Leadership and Responsibility

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Course Name: Geometric Dimensioning and Tolerancing

Course Abbreviation: DDT 1143

Classification: Vocational–Technical Elective (Architectural Engineering Technology/Technician; General Drafting Associate’s Degree and Certificate)

Description: A continuation of conventional dimensioning with emphasis on concepts as adopted by the American National Standards Institute (ANSI); a study of international dimensioning symbols used to control tolerances of form, profile, orientation, runout, and location of features on an object (3 sch: 2-hr lecture, 2-hr lab)

Pre/Corequisites: Machine Drafting I (DDT 1133)

Competencies and Suggested Objectives	
1. Manage dimensioning and tolerancing symbols, terms, definitions, and concepts. (DOK1)	DDS1, DDS3, DDS6, DDS10
a. Describe a feature control frame and its elements. (DOK1)	
b. Identify geometric characteristic symbols. (DOK1)	
c. List the material condition symbols, and describe their purposes. (DOK1)	
d. Define the term “basic dimensions.” (DOK1)	
e. Explain what the term “datum” implies. (DOK1)	
2. Apply “geometric dimensioning and tolerancing” on a drawing. (DOK1)	DDS1, DDS2, DDS3, DDS4, DDS5, DDS6, DDS7, DDS8, DDS9, DDS10
a. Prepare a fully dimensioned drawing complete with geometric dimensioning and tolerancing. (DOK2)	
b. Interpret a basic feature control frame. (DOK1)	
c. Explain and interpret the effects of the modifiers on the tolerance zone. (DOK2)	

STANDARDS

American Design Drafting Association Skills Design Standards

DDS1	General Drafting Terminology
DDS2	View Identification
DDS3	Dimensioning Standards and Terminology
DDS4	Sections View Standards and Terminology
DDS5	Orthographic Projections Standards and Terminology
DDS6	General Drafting Standards
DDS7	Manufacturing Processes and Welding
DDS8	Pictorial View Standards and Terminology
DDS9	Auxiliary View Standards, Definitions, and Terminology
DDS10	Computer/CADD Terminology

Related Academic Standards

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
- M1 Addition of Whole Numbers (no regrouping, regrouping)
- M2 Subtraction of Whole Numbers (no regrouping, regrouping)
- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
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21st Century Skills

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- CS7 Critical Thinking and Problem Solving
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- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction

CS14 Social and Cross-Cultural Skills
CS15 Productivity and Accountability
CS16 Leadership and Responsibility

SUGGESTED REFERENCES

Books

Madsen, D. A., & Madsen, D. P. (2010). *Geometric dimensioning and tolerancing*. Tinley Park, IL: Goodheart-Willcox.

Shumaker, T., Madsen, D. A., & Madsen, D. P. (2009). *AutoCAD and its applications basics 2010*. Tinley Park, IL: Goodheart-Willcox.

Wilson, B. (2005). *Design dimensioning and tolerancing*. Tinley Park, IL: Goodheart-Willcox.

Course Name: Descriptive Geometry

Course Abbreviation: DDT 1153

Classification: Vocational–Technical Elective (Architectural and Engineering Technology/Technician; General Drafting Associate Degree’s and Certificate); Vocational–Technical Core (Geographical Information Systems Technology Associate’s Degree)

Description: Theory and problems designed to develop the ability to visualize points, lines, and surfaces of space (3 sch: 1-hr lecture, 4-hr lab)

Pre/Corequisites: Fundamentals of Drafting (DDT 1113)

Competencies and Suggested Objectives	
1. Develop principal and auxiliary views.	DDS1, DDS2, DDS5, DDS6, DDS8, DDS9
a. Read and analyze a multi-view drawing by lines and surfaces.	(DOK2)
b. Construct top, front, and auxiliary adjacent views.	(DOK2)
2. Solve problems of spatial relationships.	DDS1, DDS5, DDS6, DDS9
a. Locate points and lines in space.	(DOK2)
b. Find true lengths and slopes of lines.	(DOK2)
c. Recognize parallel, intersecting, and perpendicular lines, and solve problems related to each.	(DOK2)
d. Draw lines in a prescribed direction.	(DOK2)
e. Locate points and lines in a plane.	(DOK2)
f. Solve slope, strike, and true size of plane problems.	(DOK2)
3. Solve problems of lines, planes, and angles.	DDS1, DDS5, DDS6, DDS9
a. Determine the intersection of a line and plane.	(DOK2)
b. Determine the intersection of two planes.	(DOK2)
c. Solve problems involving dihedral angles.	(DOK2)
d. Solve a basic revolution of a line and point problem.	(DOK2)

STANDARDS

American Design Drafting Association Skills Design Standards

DDS1	General Drafting Terminology
DDS2	View Identification
DDS5	Orthographic Projections Standards and Terminology
DDS6	General Drafting Standards
DDS8	Pictorial View Standards and Terminology
DDS9	Auxiliary View Standards, Definitions, and Terminology

Related Academic Standards

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
- M1 Addition of Whole Numbers (no regrouping, regrouping)
- M2 Subtraction of Whole Numbers (no regrouping, regrouping)
- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

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21st Century Skills

- CS1 Global Awareness
- CS5 Environmental Literacy
- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration
- CS9 Information Literacy
- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction

CS15 Productivity and Accountability
CS16 Leadership and Responsibility

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Holiday-Darr, K. (1998). *Applied descriptive geometry*. Clifton Park, NY: Delmar, Cengage Learning

Pare, E. G., Loving, R. O., Hill, I., & Pare, R. C. (1997). *Descriptive geometry*. Upper Saddle River, NJ: Prentice Hall.

Standiford, K., & Standiford, D. (2001). *Descriptive geometry, an integrated approach using AutoCAD*. Clifton Park, NY: Delmar, Cengage Learning.

Course Name: Construction Materials

Course Abbreviation: DDT 1213

Classification: Vocational–Technical Core (Architectural Engineering Technology/Technician; General Drafting Associate’s Degree); Vocational–Technical Elective (General Drafting Certificate)

Description: Physical properties of the materials generally used in the erection of a structure, with a brief description of their manufacture (3 sch: 2-hr lecture, 2-hr lab)

Pre/Corequisites: None

Competencies and Suggested Objectives	
1. Utilize the MasterFormat divisions of the Construction Specifications Institute (CSI).	DDSI, DDS6, DDS7
2. Describe the uses of wood components.	DDSI, DDS6, DDS7
a. Identify and describe diseases and lumber defects.	(DOK1)
b. Calculate board feet of lumber.	(DOK2)
c. Identify the different types of lumber used in construction and their design factors.	(DOK1)
3. Describe concrete characteristics.	DDSI, DDS6, DDS7
a. Describe the use of common and special types of concrete.	(DOK1)
b. Classify aggregates.	(DOK1)
c. Explain how the design and control of concrete are maintained.	(DOK2)
d. Describe the psi rating system for concrete.	(DOK1)
e. Identify and describe common concrete and brick masonry units.	(DOK1)
f. Explain purposes of concrete additives.	(DOK1)
4. Describe the use of bricks in construction.	DDSI, DDS6, DDS7
a. Describe different types of bricks.	(DOK1)
b. Describe the different types of brick bonds.	(DOK1)
c. Identify and describe the brick pattern bonds.	(DOK1)
d. Identify and describe the different mortar joints.	(DOK1)
5. Describe various cover materials used in construction.	DDSI, DDS6, DDS7
a. Identify and describe the different types of exterior wall materials and their specific purposes.	(DOK1)
b. Identify and describe different types of insulating materials and their special purposes.	(DOK1)
c. Identify and describe the different types of floor coverings and their special uses.	(DOK1)
d. Identify and describe the different types of roofing materials.	(DOK1)
e. Identify and describe the different types of finishing materials and their special uses.	(DOK1)
f. Identify and describe different types of protective and decorative coatings and their special uses.	(DOK1)
6. Discuss the various types and applications of metals in construction.	DDSI, DDS6, DDS7

STANDARDS

American Design Drafting Association Skills Design Standards

- DDS1 General Drafting Terminology
- DDS6 General Drafting Standards
- DDS7 Manufacturing Processes and Welding

Related Academic Standards

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
- M1 Addition of Whole Numbers (no regrouping, regrouping)
- M2 Subtraction of Whole Numbers (no regrouping, regrouping)
- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

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21st Century Skills

- CS1 Global Awareness
- CS2 Financial, Economic, Business, and Entrepreneurial Literacy
- CS4 Health Literacy
- CS5 Environmental Literacy
- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration
- CS9 Information Literacy
- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS14 Social and Cross-Cultural Skills
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

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- Ching, F., & Adams, C. (2001). *Building construction illustrated*. New York: John Wiley and Sons.
- Kang, K. (1998). *Graphic guide to frame construction*. Englewood Cliffs, NJ: Prentice Hall.
- Spence, W. (1998). *Construction materials, methods, and techniques*. Clifton Park, NY: Delmar, Cengage Learning.

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- Insight Media. (1998). *Building construction: Basic site development* [Videotape]. (Available from Insight Media, 2162 Broadway, New York, NY 10024-0621)
- Insight Media. (1998). *Building construction: Basic surveying* [Videotape]. (Available from Insight Media, 2162 Broadway, New York, NY 10024-0621)

Course Name: Principles of CAD

Course Abbreviation: DDT 1313

Classification: Vocational–Technical Core

Description: Basic operating system and drafting skills on CAD (3 sch: 2-hr lecture, 2-hr lab)

Pre/Corequisites: Fundamentals of Drafting (DDT 1113) or consent of instructor

Competencies and Suggested Objectives	
1. Manage the operating system. ^{DDST0}	
a. Examine the contents of storage devices. ^(DOK1)	
b. List, erase, rename, and copy files on storage devices. ^(DOK1)	
d. Examine, create, remove, and move files between folders and subfolders. ^(DOK1)	
e. Access information services (e.g., Internet, e-mail, and networks). ^(DOK1)	
2. Use the basic hardware of the CAD system. ^{DDST, DDST0}	
a. Input data using keyboard and graphics tablet, or mouse. ^(DOK1)	
b. Access files and/or symbols from the hard disk. ^(DOK1)	
c. Store, retrieve, copy, and delete drawings and files. ^(DOK1)	
3. Perform drafting functions on the CAD system. ^{DDST, DDS2, DDS3, DDS5, DDS6, DDST0}	
a. Construct single-view and multi-view drawings. ^(DOK2)	
b. Modify or edit an existing drawing. ^(DOK2)	
c. Modify the existing system variables. ^(DOK2)	

STANDARDS

American Design Drafting Association Skills Design Standards

DDS1	General Drafting Terminology
DDS2	View Identification
DDS3	Dimensioning Standards and Terminology
DDS5	Orthographic Projections Standards and Terminology
DDS6	General Drafting Standards
DDS10	Computer/CADD Terminology

Related Academic Standards

R1	Interpret Graphic Information (forms, maps, reference sources)
R2	Words in Context (same and opposite meaning)
R3	Recall Information (details, sequence)
R4	Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5	Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
M1	Addition of Whole Numbers (no regrouping, regrouping)
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- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
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21st Century Skills

- CS1 Global Awareness
- CS4 Health Literacy
- CS5 Environmental Literacy
- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration
- CS9 Information Literacy
- CS10 Media Literacy
- CS11 ICT Literacy
- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

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Dix, M., & Riley, P. (2010). *Discovering AutoCAD 2010*. Columbus, OH: Pearson.

French, T. E., Svenson, C. L., Helsel, J. D., & Urbanick, B. (2005). *Mechanical drawing CAD-communications*. New York: Glencoe/McGraw-Hill.

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Insight Media. (2000). *Engineering drawing series* [Videotape]. (Available from Insight Media, 2162 Broadway, New York, NY 10024-0621)

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Allen, L. (n.d.). *Lynn Allen's blog*. Retrieved March 5, 2010, from <http://lynn.blogs.com/>

Watson, D. (n.d.). *CAD tutor*. Retrieved March 5, 2010, from www.cadtutor.net

Whitton, A. (n.d.). *My CAD site*. Retrieved March 5, 2010, from www.we-r-here.com/cad

Course Name: Intermediate CAD

Course Abbreviation: DDT 1323

Classification: Vocational–Technical Core (General Drafting Associate’s Degree and Certificate; Architectural Engineering Technology/Technician); Vocational–Technical Elective (Geographical Information Systems Technology)

Description: Continuation of Principles of CAD (DDT 1313). Subject areas include dimensioning, sectional views, and symbols. (3 sch: 2-hr lecture, 2-hr lab)

Pre/Corequisites: Principles of CAD (DDT 1313)

Competencies and Suggested Objectives	
1. Dimension drawings by the use of CAD. ^{DDS1, DDS2, DDS3, DDS4, DDS5, DDS6, DDS7, DDS8, DDS9, DDS10}	
a. Draw and dimension per industry standards. ^(DOK2)	
b. Apply dimensions using unidirectional and aligned systems of dimensions. ^(DOK2)	
2. Draw sectional views in CAD. ^{DDS1, DDS2, DDS3, DDS4, DDS5, DDS6, DDS7, DDS10}	
a. Draw a multi-view drawing including a full section and apply section lining. ^(DOK2)	
b. Draw a multi-view drawing including a half section and apply section lining. ^(DOK2)	
c. Draw a multi-view drawing including an offset section and apply section lining. ^(DOK2)	
3. Manipulate data between files. ^{DDS1, DDS6, DDS10}	
a. Export drawing data/files. ^(DOK2)	
b. Import drawing data/files. ^(DOK2)	
c. Translate drawing data/files. ^(DOK2)	
d. Minimize file size. ^(DOK2)	
e. Utilize external reference files. ^(DOK2)	
4. Develop a symbol library, and assign attributes. ^{DDS1, DDS6, DDS7, DDS10}	
a. Assign visible and hidden values to blocks. ^(DOK2)	
b. Create/Edit attributes in blocks and dynamic blocks. ^(DOK2)	
c. Construct a template file for the collection of block attributes. ^(DOK2)	
d. Collect attribute values of a bill of materials. ^(DOK2)	
5. Execute various plots using layouts (paper space). ^{DDS1, DDS6, DDS10}	
a. Create and manage view ports. ^(DOK2)	
b. Assign plotting scales to view ports. ^(DOK2)	

STANDARDS

American Design Drafting Association Skills Design Standards

DDS1	General Drafting Terminology
DDS2	View Identification
DDS3	Dimensioning Standards and Terminology
DDS4	Sections View Standards and Terminology
DDS5	Orthographic Projections Standards and Terminology
DDS6	General Drafting Standards

DDS7	Manufacturing Processes and Welding
DDS8	Pictorial View Standards and Terminology
DDS9	Auxiliary View Standards, Definitions, and Terminology
DDS10	Computer/CADD Terminology

Related Academic Standards

R1	Interpret Graphic Information (forms, maps, reference sources)
R2	Words in Context (same and opposite meaning)
R3	Recall Information (details, sequence)
R4	Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
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M3	Multiplication of Whole Numbers (no regrouping, regrouping)
M4	Division of Whole Numbers (no remainder, remainder)
M5	Decimals (addition, subtraction, multiplication, division)
M6	Fractions (addition, subtraction, multiplication, division)
M7	Integers (addition, subtraction, multiplication, division)
M8	Percents
M9	Algebraic Operations
A1	Numeration (ordering, place value, scientific notation)
A2	Number Theory (ratio, proportion)
A3	Data Interpretation (graph, table, chart, diagram)
A4	Pre-Algebra and Algebra (equations, inequality)
A5	Measurement (money, time, temperature, length, area, volume)
A6	Geometry (angles, Pythagorean theory)
A7	Computation in Context (whole numbers, decimals, fractions, algebraic operations)
A8	Estimation (rounding, estimation)
L1	Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
L2	Sentence Formation (fragments, run-on, clarity)
L3	Paragraph Development (topic sentence, supporting sentence, sequence)
L4	Capitalization (proper noun, titles)
L5	Punctuation (comma, semicolon)
L6	Writing Conventions (quotation marks, apostrophe, parts of a letter)
S1	Vowel (short, long)
S2	Consonant (variant spelling, silent letter)
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21st Century Skills

CS1	Global Awareness
CS5	Environmental Literacy
CS6	Creativity and Innovation

- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration
- CS9 Information Literacy
- CS10 Media Literacy
- CS11 ICT Literacy
- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

SUGGESTED REFERENCES

Books

- Dix, M., & Riley, P. (2010). *Discovering AutoCAD 2010*. Columbus, OH: Pearson.
- French, T. E., Svenson, C. L., Hesel, J. D., & Urbanick, B. (2005). *Mechanical drawing CAD-communications*. New York: Glencoe/McGraw-Hill.
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- Shumaker, T. M., & Madsen, D. A. (2005). *AutoCAD and its applications—BASICS*. New York: Goodheart-Willcox.
- Wohlens, T. T. (2005). *Applying AutoCAD 2005: A step-by-step approach for AutoCAD*. New York: Glencoe/McGraw-Hill.

Videos

- Insight Media. (2000). *CAD: Creative design*. [Videotape]. (Available from Insight Media, 2162 Broadway, New York, NY 10024-0621)
- Insight Media. (2000). *Engineering drawing series* [Videotape]. (Available from Insight Media, 2162 Broadway, New York, NY 10024-0621)
- Insight Media. (2000). *Inspirational CAD* [Videotape]. (Available from Insight Media, 2162 Broadway, New York, NY 10024-0621)

Course Name: Elementary Surveying

Course Abbreviation: DDT 1413

Classification: Vocational–Technical Core (General Drafting Certificate; Geographical Information Systems Technology Associate’s Degree and Certificate); Vocational–Technical Elective (Architectural Engineering Technology/Technician; General Drafting Associate’s Degree)

Description: Basic course dealing with principles of geometry, theory, and use of instruments; mathematical calculations; and the control and reduction of errors (3 sch: 1-hr lecture, 4-hr lab)

Pre/Corequisites: Consent of instructor

Competencies and Suggested Objectives	
1. Collect and record various measurements.	DDS1, DDS6, DDS10
a. Describe the use of the United States Geological Survey benchmark.	(DOK1)
b. Measure horizontal and vertical angles.	(DOK2)
c. Measure horizontal and vertical distances in English and metric measurements.	(DOK2)
d. Demonstrate differences in elevation between random points.	(DOK1)
e. Record and interpret field notes.	(DOK2)
f. Explain the various duties of each member of a survey party.	(DOK2)
2. Use surveying equipment, terms, and communications.	DDS1, DDS6, DDS10
a. Identify and explain the basic surveying equipment.	(DOK1)
b. Set up the equipment, shoot elevations, and record.	(DOK2)

STANDARDS

American Design Drafting Association Skills Design Standards

DDS1	General Drafting Terminology
DDS6	General Drafting Standards
DDS10	Computer/CADD Terminology

Related Academic Standards

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
- M1 Addition of Whole Numbers (no regrouping, regrouping)
- M2 Subtraction of Whole Numbers (no regrouping, regrouping)
- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)

- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

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21st Century Skills

- CS1 Global Awareness
- CS3 Civic Literacy
- CS5 Environmental Literacy
- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration
- CS9 Information Literacy
- CS11 ICT Literacy
- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS14 Social and Cross-Cultural Skills
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

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Course Name: Blueprint Reading I

Course Abbreviation: DDT 1513

Classification: Service course for vocational–technical programs

Description: Terms and definitions used in reading blueprints. Basic sketching, drawing, and dimensioning of objects will be covered. (3 sch: 2-hr lecture, 2-hr lab)

Pre/Corequisites: Consent of instructor

Competencies and Suggested Objectives	
1. Use the basic drawing equipment and terms used in sketching and making drawings. ^{DDS1, DDS6}	
a. Identify terms, symbols, and lines used in blueprints. ^(DOK1)	
b. Utilize the basic equipment for sketching and/or drawing. ^(DOK2)	
2. Interpret blueprints. ^{DDS1, DDS2, DDS3, DDS4, DDS5, DDS6, DDS8}	
a. Identify the three basic views of a drawing. ^(DOK1)	
b. Identify the various lines used on drawings. ^(DOK1)	
c. Interpret dimensions and symbols. ^(DOK2)	
d. Interpret general and specific notes on drawings. ^(DOK2)	
e. Locate features on drawings. ^(DOK2)	

STANDARDS

American Design Drafting Association Skills Design Standards

DDS1	General Drafting Terminology
DDS2	View Identification
DDS3	Dimensioning Standards and Terminology
DDS4	Sections View Standards and Terminology
DDS5	Orthographic Projections Standards and Terminology
DDS6	General Drafting Standards
DDS8	Pictorial View Standards and Terminology

Related Academic Standards

R1	Interpret Graphic Information (forms, maps, reference sources)
R2	Words in Context (same and opposite meaning)
R3	Recall Information (details, sequence)
R4	Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5	Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
M1	Addition of Whole Numbers (no regrouping, regrouping)
M2	Subtraction of Whole Numbers (no regrouping, regrouping)
M3	Multiplication of Whole Numbers (no regrouping, regrouping)

- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

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21st Century Skills

- CS1 Global Awareness
- CS5 Environmental Literacy
- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration
- CS9 Information Literacy
- CS11 ICT Literacy
- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

SUGGESTED REFERENCES

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Course Name: Blueprint Reading II

Course Abbreviation: DDT 1523

Classification: Service course for vocational–technical programs

Description: Continuation of Blueprint Reading I with emphasis placed on reading and interpreting blueprints for different types of structures and performing basic calculations (3 sch: 2-hr lecture, 2-hr lab)

Pre/Corequisites: Blueprint Reading I (DDT 1513)

Competencies and Suggested Objectives	
1. Identify members in a structure and their purposes.	DDS1, DDS4, DDS6
a. Read and specify framing span charts for floor joists, ceiling joists, and rafters.	(DOK2)
b. Identify a minimum of five types of roofs, and sketch them in a plan view.	(DOK1)
2. Perform architectural calculations.	DDS1, DDS2, DDS3, DDS4, DDS5, DDS6, DDS8
a. Calculate square footage, cubic yards, and board feet, and estimate quantities of the materials.	(DOK2)
b. Identify calculations related to commercial plans.	(DOK1)

STANDARDS

American Design Drafting Association Skills Design Standards

DDS1	General Drafting Terminology
DDS2	View Identification
DDS3	Dimensioning Standards and Terminology
DDS4	Sections View Standards and Terminology
DDS5	Orthographic Projections Standards and Terminology
DDS6	General Drafting Standards
DDS8	Pictorial View Standards and Terminology

Related Academic Standards

R1	Interpret Graphic Information (forms, maps, reference sources)
R2	Words in Context (same and opposite meaning)
R3	Recall Information (details, sequence)
R4	Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5	Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
M1	Addition of Whole Numbers (no regrouping, regrouping)
M2	Subtraction of Whole Numbers (no regrouping, regrouping)
M3	Multiplication of Whole Numbers (no regrouping, regrouping)
M4	Division of Whole Numbers (no remainder, remainder)
M5	Decimals (addition, subtraction, multiplication, division)

- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

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21st Century Skills

- CS1 Global Awareness
- CS2 Financial, Economic, Business, and Entrepreneurial Literacy
- CS3 Civic Literacy
- CS5 Environmental Literacy
- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration
- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

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Books

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Course Name: Architectural Design I

Course Abbreviation: DDT 1613

Classification: Vocational–Technical Core (Architectural Engineering Technology/Technician; General Drafting)

Description: This course is a study and development of architectural design principles for a residential structure. (3 sch: 1-hr lecture, 4-hr lab)

Pre/Corequisites: Fundamentals of Drafting (DDT 1113) and Principles of CAD (DDT 1313)

Competencies and Suggested Objectives	
1. Plan a residential structure.	DDS1, DDS6, DDS10
a. Define architectural terms.	(DOK1)
b. Describe the planning areas.	(DOK1)
c. Identify and apply building codes.	(DOK2)
2. Draw a set of working drawings for a residential structure.	DDS1, DDS2, DDS3, DDS4, DDS5, DDS6, DDS8, DDS9, DDS10
a. Select the correct scale for the different drawings.	(DOK1)
b. Draw a floor plan.	(DOK2)
c. Draw a set of exterior elevations.	(DOK2)
d. Draw a site plan.	(DOK2)
e. Draw an electrical plan.	(DOK2)
f. Draw interior elevations and details as needed.	(DOK2)
g. Create a window and door schedule.	(DOK2)
h. Draw necessary details and section views.	(DOK2)
i. Draw a foundation plan with details.	(DOK2)

STANDARDS

American Design Drafting Association Skills Design Standards

DDS1	General Drafting Terminology
DDS2	View Identification
DDS3	Dimensioning Standards and Terminology
DDS4	Sections View Standards and Terminology
DDS5	Orthographic Projections Standards and Terminology
DDS6	General Drafting Standards
DDS8	Pictorial View Standards and Terminology
DDS9	Auxiliary View Standards, Definitions, and Terminology
DDS10	Computer/CADD Terminology

Related Academic Standards

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
- M1 Addition of Whole Numbers (no regrouping, regrouping)
- M2 Subtraction of Whole Numbers (no regrouping, regrouping)
- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

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21st Century Skills

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- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration

- CS9 Information Literacy
- CS10 Media Literacy
- CS11 ICT Literacy
- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS14 Social and Cross-Cultural Skills
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

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Course Name: Fundamentals of Machining Processes

Course Abbreviation: DDT 1713

Classification: Vocational–Technical Elective (General Drafting)

Description: Basic machining equipment and safety procedures. Emphasis is placed on measurement techniques, machine technology, machine tools, and applications (a course for drafting students with no previous machining experience). (3 sch: 2-hr lecture, 2-hr lab)

Pre/Corequisites: None

Competencies and Suggested Objectives	
1. Identify and apply skills to basic machining processes.	DDST, DDS6, DDS7
a. Describe the concept of interchangeable parts and their contribution to mass production.	(DOK1)
b. Discuss the manufacturing processes for a typical industry.	(DOK1)
c. Identify the major systems for measurement used in industry.	(DOK1)
d. Identify and demonstrate instruments and tools used to make measurements in industry.	(DOK2)
2. Discuss the safe use of basic tools and machines.	DDS7
a. Identify and describe the safe use of common bench and hand tools.	(DOK1)
b. Discuss the safe use parts and accessories of machines.	(DOK1)

STANDARDS

American Design Drafting Association Skills Design Standards

DDS1	General Drafting Terminology
DDS6	General Drafting Standards
DDS7	Manufacturing Processes and Welding

Related Academic Standards

R1	Interpret Graphic Information (forms, maps, reference sources)
R2	Words in Context (same and opposite meaning)
R3	Recall Information (details, sequence)
R4	Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5	Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
M1	Addition of Whole Numbers (no regrouping, regrouping)
M2	Subtraction of Whole Numbers (no regrouping, regrouping)
M3	Multiplication of Whole Numbers (no regrouping, regrouping)
M4	Division of Whole Numbers (no remainder, remainder)
M5	Decimals (addition, subtraction, multiplication, division)
M6	Fractions (addition, subtraction, multiplication, division)

- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
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- CS1 Global Awareness
- CS4 Health Literacy
- CS5 Environmental Literacy
- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration
- CS11 ICT Literacy
- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS14 Social and Cross-Cultural Skills
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

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Course Name: Design for Manufacturing

Course Abbreviation: DDT 1813

Classification: Vocational–Technical Elective (General Drafting)

Description: Instruction in various methods of manufacturing with emphasis on the drafter's role in manufacturing (3 sch: 2-hr lecture, 2-hr lab)

Pre/Corequisites: None

Competencies and Suggested Objectives	
1. Discuss different types of manufacturing processes.	DDS1, DDS6, DDS7
a. Describe different types of plastic processing.	(DOK1)
b. Describe different types of metal processing.	(DOK1)
2. Apply manufacturing requirements to the design process.	DDS3, DDS7, DDS10
a. Apply association standards/guidelines to a design.	(DOK2)
b. Apply dimension/tolerancing techniques according to the manufacturing process.	(DOK2)
c. Evaluate a design drawing as to conformance to manufacturing requirements.	(DOK2)

STANDARDS

American Design Drafting Association Skills Design Standards

DDS1	General Drafting Terminology
DDS3	Dimensioning Standards and Terminology
DDS6	General Drafting Standards
DDS7	Manufacturing Processes and Welding
DDS10	Computer/CADD Terminology

Related Academic Standards

R1	Interpret Graphic Information (forms, maps, reference sources)
R2	Words in Context (same and opposite meaning)
R3	Recall Information (details, sequence)
R4	Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5	Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
M1	Addition of Whole Numbers (no regrouping, regrouping)
M2	Subtraction of Whole Numbers (no regrouping, regrouping)
M3	Multiplication of Whole Numbers (no regrouping, regrouping)
M4	Division of Whole Numbers (no remainder, remainder)
M5	Decimals (addition, subtraction, multiplication, division)
M6	Fractions (addition, subtraction, multiplication, division)
M7	Integers (addition, subtraction, multiplication, division)
M8	Percents

- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

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21st Century Skills

- CS1 Global Awareness
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- CS4 Health Literacy
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- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration
- CS9 Information Literacy
- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

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- Wright, T. R. (1999). *Processes of manufacturing*. Tinley Park, IL: Goodheart-Willcox.

Course Name: Civil Drafting

Course Abbreviation: DDT 2153

Classification: Vocational–Technical Core (Architectural Engineering Technology/Technician; General Drafting)

Description: Course dealing with basic principles of surveying and the development of topographical maps (3 sch: 2-hr lecture, 2-hr lab)

Pre/Corequisites: Fundamentals of Drafting (DDT 1113) and Principles of CAD (DDT 1313) or consent of instructor

Competencies and Suggested Objectives	
1. Use surveying equipment, terms, and communications.	DDS1
a. Identify and explain the basic surveying equipment.	(DOK1)
b. Set up the equipment.	(DOK2)
2. Collect and record various measurements.	DDS3, DDS6, DDS10
a. Measure horizontal and vertical angles.	(DOK2)
b. Measure horizontal and vertical distances.	(DOK2)
c. Record and interpret field notes.	(DOK2)
3. Lay out and develop various maps.	DDS1, DDS2, DDS4, DDS6, DDS10
a. Explain and draw a plan and profile.	(DOK2)
b. Define the various maps and symbols used in mapping.	(DOK1)
4. Interpret field notes, and develop required drawings.	DDS1, DDS2, DDS3, DDS4, DDS6, DDS10
a. Explain an engineering drawing.	(DOK1)
b. Determine the correct scale size.	(DOK1)
c. Complete a drawing from field notes.	(DOK2)

STANDARDS

American Design Drafting Association Skills Design Standards

DDS1	General Drafting Terminology
DDS2	View Identification
DDS3	Dimensioning Standards and Terminology
DDS4	Sections View Standards and Terminology
DDS6	General Drafting Standards
DDS10	Computer/CADD Terminology

Related Academic Standards

R1	Interpret Graphic Information (forms, maps, reference sources)
R2	Words in Context (same and opposite meaning)
R3	Recall Information (details, sequence)

- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
- M1 Addition of Whole Numbers (no regrouping, regrouping)
- M2 Subtraction of Whole Numbers (no regrouping, regrouping)
- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
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21st Century Skills

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- CS9 Information Literacy
- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS14 Social and Cross-Cultural Skills
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

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Course Name: Machine Drafting II

Course Abbreviation: DDT 2163

Classification: Vocational–Technical Core (General Drafting Certificate); Vocational–Technical Elective (General Drafting Associate’s Degree)

Description: A continuation of Machine Drafting I with emphasis on advanced techniques and knowledge employed in the planning of mechanical objects; includes instruction in the use of tolerancing and dimensioning techniques (3 sch: 2-hr lecture, 2-hr lab)

Pre/Corequisites: Machine Drafting I (DDT 1133)

Competencies and Suggested Objectives	
1. Create drawings from a given mechanical part.	DDS1, DDS2, DDS3, DDS4, DDS5, DDS6, DDS10
a. Sketch the given part.	(DOK2)
b. Take and record measurements from the given part.	(DOK2)
c. Prepare a finished drawing.	(DOK2)
2. Construct and design working drawings.	DDS1, DDS2, DDS3, DDS4, DDS5, DDS6, DDS7, DDS8, DDS9, DDS10
a. Apply modification techniques.	(DOK2)
b. Interpret and apply geometric tolerancing.	(DOK2)

STANDARDS

American Design Drafting Association Skill Standards

DDS1	General Drafting Terminology
DDS2	View Identification
DDS3	Dimensioning Standards and Terminology
DDS4	Sections View Standards and Terminology
DDS5	Orthographic Projections Standards and Terminology
DDS6	General Drafting Standards
DDS7	Manufacturing Processes and Welding
DDS8	Pictorial View Standards and Terminology
DDS9	Auxiliary View Standards, Definitions, and Terminology
DDS10	Computer/CADD Terminology

Related Academic Standards

R1	Interpret Graphic Information (forms, maps, reference sources)
R2	Words in Context (same and opposite meaning)
R3	Recall Information (details, sequence)
R4	Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5	Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
M1	Addition of Whole Numbers (no regrouping, regrouping)

- M2 Subtraction of Whole Numbers (no regrouping, regrouping)
- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
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21st Century Skills

- CS1 Global Awareness
- CS5 Environmental Literacy
- CS6 Creativity and Innovation
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- CS8 Communication and Collaboration
- CS9 Information Literacy
- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

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Course Name: Structural Drafting I

Course Abbreviation: DDT 2213

Classification: Vocational–Technical Core (Architectural Engineering Technology/Technician; General Drafting Associate’s Degree); Vocational–Technical Elective (General Drafting Certificate)

Description: Structural section, terms, and conventional abbreviations and symbols used by structural fabricators and erectors are studied. Knowledge is gained in the use of the A.I.S.C. Handbook. Problems are studied that involve structural designing and drawing of beams, columns, connections, trusses, and bracing (steel, concrete, and wood). (3 sch: 1-hr lecture, 4-hr lab)

Pre/Corequisites: Fundamentals of Drafting (DDT 1113) and Principles of CAD (DDT 1313)

Competencies and Suggested Objectives	
1. Utilize data on design of structural members.	DDS1, DDS4, DDS6, DDS7
a. Identify and describe physical properties of materials.	(DOK1)
b. Read and interpret data utilizing standard references.	(DOK1)
2. Construct structural plans.	DDS1, DDS2, DDS3, DDS4, DDS5, DDS6, DDS7, DDS10
a. Draw a detail of connections of structural members.	(DOK2)
b. Draw structural framing plans.	(DOK2)

STANDARDS

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DDS4	Sections View Standards and Terminology
DDS5	Orthographic Projections Standards and Terminology
DDS6	General Drafting Standards
DDS7	Manufacturing Processes and Welding
DDS10	Computer/CADD Terminology

Related Academic Standards

R1	Interpret Graphic Information (forms, maps, reference sources)
R2	Words in Context (same and opposite meaning)
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- M8 Percents
- M9 Algebraic Operations
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- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
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- CS13 Initiative and Self-Direction
- CS14 Social and Cross-Cultural Skills
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

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Course Name: Structural Drafting II

Course Abbreviation: DDT 2233

Classification: Vocational–Technical Elective (Architectural Engineering Technology/Technician; General Drafting Associate’s Degree)

Description: Study of the miscellaneous areas of structural drafting including stairs, handrails, and cage ladders (3 sch: 1-hr lecture, 4-hr lab)

Pre/Corequisites: Intermediate CAD (DDT 1323) and Structural Drafting I (DDT 2213)

Competencies and Suggested Objectives	
1. Locate miscellaneous steel on architectural and structural design drawings. (DDS1, DDS2, DDS3, DDS4, DDS5, DDS6, DDS10)	
a. Using a set of construction drawings, highlight all instances of miscellaneous steel. (DOK2)	
b. Create a detailing estimate from a set of construction drawings. (DOK2)	
2. Produce erection and shop drawings for miscellaneous steel items. (DDS1, DDS2, DDS3, DDS4, DDS5, DDS6, DDS7, DDS10)	
a. Prepare a complete set of erection and fabrication drawings for a steel stair system. (DOK2)	
b. Prepare a complete set of erection and fabrication drawings for a steel handrail system. (DOK2)	
c. Prepare a complete set of erection and fabrication drawings for a steel cage-ladder system. (DOK2)	

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DDS10	Computer/CADD Terminology

Related Academic Standards

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R2	Words in Context (same and opposite meaning)
R3	Recall Information (details, sequence)

- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
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- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
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- A6 Geometry (angles, Pythagorean theory)
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- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
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Course Name: Cost Estimating

Course Abbreviation: DDT 2243

Classification: Vocational–Technical Core (Architectural Engineering Technology/Technician); Vocational–Technical Elective (General Drafting)

Description: Preparation of material and labor quantity surveys from actual working drawings and specifications (3 sch: 2-hr lecture, 2-hr lab)

Pre/Corequisites: Consent of instructor

Competencies and Suggested Objectives	
1. Prepare a cost estimate of an assigned building.	DDST1, DDS2, DDS3, DDS4, DDS6, DDS8, DDS10
a. Define the different types of estimates and specific purposes of each.	(DOK1)
b. Prepare estimates of various kinds of foundations.	(DOK2)
c. Estimate wall, ceiling, and roof frames.	(DOK2)
d. Estimate exterior and interior finishes.	(DOK2)
e. Estimate sub-contract items.	(DOK2)
2. Discuss the best construction methods based on project requirements.	DDST1, DDS3, DDS4, DDS6, DDS10
a. List the different types of construction in residential and commercial buildings.	(DOK1)
b. Discuss the best method of construction in residential and commercial buildings.	(DOK1)
3. Discuss principles of contracts for construction.	DDST1, DDS2, DDS3, DDS6
a. Identify and describe the essential elements of a contract.	(DOK1)
b. Describe how contracts are terminated.	(DOK1)
c. Describe different types of construction contracts and their specific purpose.	(DOK1)
d. List bidding procedures.	(DOK1)
4. Complete a materials list for a structure.	DDST1, DDS2, DDS3, DDS4, DDS6, DDS10
a. Describe the procedures of doing a materials list.	(DOK1)
b. Explain the purposes for a materials list.	(DOK1)
c. Complete a materials form for a construction project.	(DOK2)

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Related Academic Standards

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
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- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
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- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
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- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
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- CS14 Social and Cross-Cultural Skills
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- CS16 Leadership and Responsibility

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Course Name: Statics and Strength of Materials

Course Abbreviation: DDT 2253

Classification: Vocational–Technical Elective (Architectural Engineering Technology/Technician; General Drafting)

Description: Study of forces acting on bodies; moments of forces; stress of materials; basic machine design; and beams, columns, and connections (3 sch: 2-hr lecture, 2-hr lab)

Pre/Corequisites: College Algebra (MAT 1313) or by consent of instructor

Competencies and Suggested Objectives	
1. Apply basic procedures for determining the behavior of structures under loads. ^{DDS1, DDS3, DDS4, DDS6}	
a. Identify and solve force systems. ^(DOK1)	
b. Graphically solve and verify mathematical problems involving force systems. ^(DOK2)	
c. Read or use stress and strain curves. ^(DOK2)	
d. Calculate the results of tensile and compression loading. ^(DOK2)	
e. Calculate the elastic limit of materials. ^(DOK2)	
f. Calculate the ultimate strength of materials. ^(DOK2)	
2. Determine the loadings of structures. ^{DDS1, DDS3, DDS4, DDS6}	
a. Draw and calculate shear and moment diagrams. ^(DOK2)	
b. Calculate the loading, both live and static, on a simple structure. ^(DOK2)	
c. Draw and calculate the bending moment diagram. ^(DOK2)	
d. Draw and calculate the maximum bending moment. ^(DOK2)	

STANDARDS

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DDS6	General Drafting Standards

Related Academic Standards

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- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
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SUGGESTED REFERENCESBooks

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Bassin, M. G. (1988). *Statics and strength of materials*. New York: McGraw-Hill.

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American Institute of Steel Construction. (n.d.). *Modern steel construction*. Chicago: Author.
Retrieved October 11, 2005, from <http://www.aisc.org/MSCTemplate.cfm>

Course Name: Quality Assurance

Course Abbreviation: DDT 2263

Classification: Vocational–Technical Elective (General Drafting Associate’s Degree)

Description: The application of statistics and probability theory in quality assurance programs. Various product sampling plans as well as the development of product charts for defective units will be studied. (3 sch: 2-hr lecture, 2-hr lab)

Pre/Corequisites: None

Competencies and Suggested Objectives	
1. Utilize basic quality assurance procedures.	DDS1, DDS3, DDS6, DDS7
a. Discuss the history, development, and current trends of quality assurance and the use of quality circles.	(DOK1)
b. Describe the concept of probability.	(DOK1)
c. Compute the following measurements of central tendency: mean, median, and mode for a given set of data.	(DOK2)
d. Describe the frequency distribution for a normal population.	(DOK1)
e. Distinguish among the terms “accuracy,” “precision,” and “accuracy and precision.”	(DOK1)
f. Compute the standard deviation and the square of the residuals for a given set of data.	(DOK2)
2. Effectively use sampling techniques.	DDS1, DDS2, DDS3, DDS6, DDS7
a. Describe the process of random sampling as applied to quality assurance.	(DOK1)
b. Compare single and multiple sampling plans.	(DOK2)
c. Describe the characteristics of the Mil. Std. 105D sampling plan.	(DOK1)
3. Effectively use various charts.	DDS1, DDS2, DDS3, DDS7, DDS10
a. Describe the general theory of a control chart.	(DOK1)
b. Describe the development and use of fraction defective charts.	(DOK1)
c. Discuss special applications of control charts.	(DOK1)
d. Apply quality assurance procedures in a laboratory setting.	(DOK2)

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21st Century Skills

- CS2 Financial, Economic, Business, and Entrepreneurial Literacy
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration
- CS9 Information Literacy
- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS14 Social and Cross-Cultural Skills
- CS15 Productivity and Accountability

CS16 Leadership and Responsibility

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- Lamb, R. G. (1995). *Availability engineering and management for manufacturing plant performance*. Upper Saddle River, NJ: Prentice Hall.
- Minty, G. (1998). *Production planning and controlling*. Tinley Park, IL: Goodheart-Willcox.

Course Name: Facilities Planning

Course Abbreviation: DDT 2273

Classification: Vocational–Technical Elective (Architectural Engineering Technology/Technician)

Description: This course deals with the techniques and procedures for developing an efficient facility layout and introduces some of the state-of-the-art tools involved, such as 3-D design and computer simulation. (3 sch: 2-hr lecture, 2-hr lab)

Pre/Corequisites: None

Competencies and Suggested Objectives	
1. Use applications of computer technology and techniques. <small>DDS1, DDS2, DDS7, DDS10</small>	
a. Use CAD for producing and editing prints of facility plans. <small>(DOK2)</small>	
b. Research the Internet for updated technology (i.e., software) for the design of facility plans. <small>(DOK2)</small>	
c. Prepare and run computer simulations to show product paths in the manufacturing facility. <small>(DOK2)</small>	
2. Apply updated manufacturing techniques as they apply to the facility. <small>DDS7</small>	
a. Demonstrate work cells. <small>(DOK2)</small>	
b. Demonstrate group technology, and show how it applies to work cells. <small>(DOK2)</small>	
c. Demonstrate efficiencies of work cells with or without the use of group technology. <small>(DOK2)</small>	
3. Design a facility around ergonomic and efficiency requirements. <small>DDS1, DDS2, DDS6, DDS7, DDS10</small>	
a. Demonstrate basic time and motion study and how it can be applied to facility planning. <small>(DOK2)</small>	
b. Demonstrate basic manufacturing processes for calculating product flow. <small>(DOK2)</small>	
c. Demonstrate balancing assembly lines, leveling workloads in manufacturing cells, and machine and personnel requirements. <small>(DOK2)</small>	
4. Analyze efficiency, productivity, and profitability for calculating efficient department layout and material handling systems and flow paths. <small>DDS1, DDS2, DDS6, DDS7, DDS10</small>	
a. Demonstrate material, labor, and product flow. <small>(DOK2)</small>	
b. Demonstrate basic productivity and profitability calculations and how they are applied to layout planning. <small>(DOK2)</small>	
c. Demonstrate basic and advanced material handling systems and advantages/disadvantages of each. <small>(DOK2)</small>	

STANDARDS

American Design Drafting Association Skills Design Standards

DDS1	General Drafting Terminology
DDS2	View Identification
DDS6	General Drafting Standards

DDS7 Manufacturing Processes and Welding
 DDS10 Computer/CADD Terminology

Related Academic Standards

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
- M1 Addition of Whole Numbers (no regrouping, regrouping)
- M2 Subtraction of Whole Numbers (no regrouping, regrouping)
- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
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21st Century Skills

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- CS2 Financial, Economic, Business, and Entrepreneurial Literacy
- CS4 Health Literacy
- CS5 Environmental Literacy
- CS6 Creativity and Innovation

- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration
- CS9 Information Literacy
- CS10 Media Literacy
- CS11 ICT Literacy
- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

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Course Name: Advanced CAD

Course Abbreviation: DDT 2343

Classification: Vocational–Technical Core (Architectural Engineering Technology/Technician; General Drafting); Vocational–Technical Elective (Geographical Information Systems Technology)

Description: A continuation of Intermediate CAD. Emphasis is placed on the user coordinate system and 3-D modeling. (3 sch: 1-hr lecture, 4-hr lab)

Pre/Corequisites: Intermediate CAD (DDT 1323)

Competencies and Suggested Objectives	
1. Manage 3-D solid models.	DDST1, DDS2, DDS3, DDS4, DDS5, DDS6, DDS8, DDS10
a. Create 3-D solid models.	(DOK3)
b. Manipulate 3-D solid models.	(DOK3)
c. Analyze 3-D solid models.	(DOK3)
2. Manage the CAD system to improve productivity.	DDST1, DDS2, DDS3, DDS4, DDS5, DDS6, DDS8, DDS10
a. Perform customization to improve productivity (e.g., customize menus, function keys, script files, and macros).	(DOK3)
b. Create customized program files.	(DOK3)

STANDARDS

American Design Drafting Association Skills Design Standards

DDS1	General Drafting Terminology
DDS2	View Identification
DDS3	Dimensioning Standards and Terminology
DDS4	Sections View Standards and Terminology
DDS5	Orthographic Projections Standards and Terminology
DDS6	General Drafting Standards
DDS8	Pictorial View Standards and Terminology
DDS10	Computer/CADD Terminology

Related Academic Standards

R1	Interpret Graphic Information (forms, maps, reference sources)
R2	Words in Context (same and opposite meaning)
R3	Recall Information (details, sequence)
R4	Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5	Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
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- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
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- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

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Course Name: CAD Management

Course Abbreviation: DDT 2353

Classification: Vocational–Technical Elective (Architectural Engineering Technology/Technician; Mechanical/Industrial; General Drafting)

Description: Topics include technical and business aspects of CAD. Standards, customization, networking, Internet integration, and employee support will be covered. (3 sch: 2-hr lecture, 2-hr lab)

Pre/Corequisites: Intermediate CAD (DDT 1323)

Competencies and Suggested Objectives	
1. Discuss CAD standards. ^{DDS6, DDS10}	
a. Research the CAD standards of local industries. ^(DOK1)	
b. Prepare a documented set of CAD standards. ^(DOK1)	
2. Customize the CAD environment to implement consistent CAD standards. ^{DDST1, DDS6, DDST10}	
a. Create a directory structure for the logical storage of CAD files. ^(DOK1)	
b. Change the CAD system settings to reflect documented CAD standards. ^(DOK1)	
3. Manage the computer to assist the collaborative efforts of a work group. ^{DDST10}	
a. Set up user directories and groups. ^(DOK1)	
b. Assign rights to users and groups. ^(DOK1)	
c. Create shortcuts to work group files. ^(DOK1)	
4. Create custom programs for repetitive tasks. ^{DDS10}	
a. Write and run a Visual Basic for Applications program. ^(DOK2)	
b. Use the CAD systems internal programming language to create a custom program. ^(DOK2)	

STANDARDS

American Design Drafting Association Skills Design Standards

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DDS6	General Drafting Standards
DDS10	Computer/CADD Terminology

Related Academic Standards

R1	Interpret Graphic Information (forms, maps, reference sources)
R2	Words in Context (same and opposite meaning)
R3	Recall Information (details, sequence)
R4	Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5	Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
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- M9 Algebraic Operations
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- A2 Number Theory (ratio, proportion)
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- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
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- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
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- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

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Wohlers, T. T. (2005). *Applying AutoCAD 2005: A step-by-step approach for AutoCAD*. New York: Glencoe/McGraw-Hill.

Course Name: Computer Numerical Control (CNC) Drafting

Course Abbreviation: DDT 2363

Classification: Vocational–Technical Elective (General Drafting Associate’s Degree)

Description: Basics of numerical control machines (3 sch: 2-hr lecture, 2-hr lab)

Prerequisite: Principles of CAD (DDT 1313)

Competencies and Suggested Objectives	
1. Identify the basic functions of CNC. ^{DDS7, DDS10}	
a. List the advantages and disadvantages of CNC. ^(DOK1)	
b. Define terms related to CNC machines. ^(DOK1)	
2. Define the principles of the coordinate systems. ^{DDS1, DDS3, DDS7, DDS10}	
a. Define and discuss the Cartesian Coordinate System. ^(DOK1)	
b. Define and discuss the Absolute Coordinate System. ^(DOK1)	
c. Define and discuss the Incremental Coordinate System. ^(DOK1)	
3. Identify the principles of the code system. ^{DDS7, DDS10}	
a. Identify the common code words. ^(DOK1)	
b. Identify the common address formats. ^(DOK1)	
4. Prepare and execute a basic CNC program. ^{DDS7, DDS10}	
a. Compute the tool length and cutter radii compensation. ^(DOK2)	
b. Identify sub-programs. ^(DOK1)	
c. Write a program for milling linear and circular cuts. ^(DOK2)	

STANDARDS

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DDS3	Dimensioning Standards and Terminology
DDS7	Manufacturing Processes and Welding
DDS10	Computer/CADD Terminology

Related Academic Standards

R1	Interpret Graphic Information (forms, maps, reference sources)
R2	Words in Context (same and opposite meaning)
R3	Recall Information (details, sequence)
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- M8 Percents
- M9 Algebraic Operations
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- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
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- CS16 Leadership and Responsibility

SUGGESTED REFERENCESBooks

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Course Name: Mapping and Topography

Course Abbreviation: DDT 2423

Classification: Vocational–Technical Elective (General Drafting; Architectural Engineering Technology/Technician; Geographical Information Systems Technology)

Description: Selected drafting techniques are applied to the problem of making maps, traverses, plot plans, plan drawings, and profile drawings using maps, field survey data, aerial photographs, and related references and materials including symbols, notations, and other applicable standardized materials. (3 sch: 2-hr lecture, 2-hr lab)

Pre/Corequisites: Elementary Surveying (DDT 1413) and Intermediate CAD (DDT 1323) or by consent of instructor

Competencies and Suggested Objectives	
1. Plan and draw a map.	DDS1, DDS3, DDS4, DDS5, DDS6, DDS8, DDS10
a. Explain and draw a plan and profile.	(DOK1)
b. Define the various maps and symbols used in mapping.	(DOK1)
c. Prepare a contour map.	(DOK2)
d. Insert raster images into drawings.	(DOK2)
2. Transform field notes into engineering drawings.	DDS1, DDS3, DDS4, DDS5, DDS6, DDS8, DDS10
a. Explain an engineering drawing.	(DOK1)
b. Determine the correct scale size.	(DOK1)
c. Explain what information is needed from the field notes to complete a drawing.	(DOK1)
d. Complete a drawing from field notes.	(DOK2)

STANDARDS

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DDS4	Sections View Standards and Terminology
DDS5	Orthographic Projections Standards and Terminology
DDS6	General Drafting Standards
DDS8	Pictorial View Standards and Terminology
DDS10	Computer/CADD Terminology

Related Academic Standards

R1	Interpret Graphic Information (forms, maps, reference sources)
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Course Name: Legal Principles of Surveying

Course Abbreviation: CIT 2113/DDT 2433

Classification: Vocational–Technical Elective (Architectural Engineering Technology/Technician; General Drafting)

Description: A study of the legal aspects of boundary controls for the survey and resurvey of real property (3 sch: 2-hr lecture, 2-hr lab)

Pre/Corequisites: Elementary Surveying (DDT 1413)

Competencies and Suggested Objectives	
1. Apply the legal aspects of surveying. ^{DDS1, DDS8}	
a. Define legal terms as used in surveying. ^(DOK1)	
b. Describe the legal aspects of boundary control. ^(DOK1)	
c. Prepare survey plats. ^(DOK2)	
d. Write a legal description of real property. ^(DOK2)	
e. Research public records for property descriptions. ^(DOK1)	
2. Comply with the technical standards for land surveying and land surveyor registration requirements set by the State of Mississippi. ^{DDS6, DDS8}	
a. Discuss the legal authority and liability of the land surveyor. ^(DOK1)	
b. Apply code of ethics in work situations. ^(DOK2)	
c. Explain the surveyor's rights, duties, and liabilities. ^(DOK1)	
d. List the technical standards for land surveying in Mississippi. ^(DOK1)	
e. Discuss land surveying registration laws and examinations in Mississippi. ^(DOK1)	

STANDARDS

American Design Drafting Association Skills Design Standards

DDS1	General Drafting Terminology
DDS6	General Drafting Standards
DDS8	Pictorial View Standards and Terminology

Related Academic Standards

R1	Interpret Graphic Information (forms, maps, reference sources)
R2	Words in Context (same and opposite meaning)
R3	Recall Information (details, sequence)
R4	Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5	Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
M1	Addition of Whole Numbers (no regrouping, regrouping)
M2	Subtraction of Whole Numbers (no regrouping, regrouping)
M3	Multiplication of Whole Numbers (no regrouping, regrouping)

- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
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- S1 Vowel (short, long)
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21st Century Skills

- CS1 Global Awareness
- CS3 Civic Literacy
- CS5 Environmental Literacy
- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration
- CS9 Information Literacy
- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS14 Social and Cross-Cultural Skills
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

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Course Name: Advanced Surveying

Course Abbreviation: CIT 2124/DDT 2443

Classification: Vocational–Technical Elective (Architectural Engineering Technology/Technician; General Drafting; Geographical Information Systems Technology)

Description: A course designed to provide the student with practical applications of skills and knowledge gained in other surveying and related courses (3 sch: 1-hr lecture, 4-hr lab)

Pre/Corequisites: Elementary Surveying (DDT 1413)

Competencies and Suggested Objectives

1. Demonstrate the ability to design and perform the necessary layout of private properties and/or commercial sites according to city, county, state, and/or federal regulations. ^{DDS1, DDS3, DDS6, DDS8, DDS10}
 - a. Obtain preliminary field data. ^(DOK1)
 - b. Create a preliminary design using horizontal curves and cul-de-sacs. ^(DOK2)
 - c. Create a finished design according to specifications. ^(DOK2)

STANDARDS

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DDS3	Dimensioning Standards and Terminology
DDS6	General Drafting Standards
DDS8	Pictorial View Standards and Terminology
DDS10	Computer/CADD Terminology

Related Academic Standards

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
- M1 Addition of Whole Numbers (no regrouping, regrouping)
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- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
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- M9 Algebraic Operations
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- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
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- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
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Course Name: GPS Surveying

Course Abbreviation: CIT 2444/DDT 2463

Classification: Vocational–Technical Core (Geographical Information Systems Technology Associate’s Degree); Vocational–Technical Elective (Architectural Engineering Technology/Technician; General Drafting; Geographical Information Systems Technology Certificate)

Description: This course teaches principles of surveying utilizing artificial earth orbit satellites. (3 sch: 1-hr lecture, 4-hr lab)

Pre/Corequisites: Elementary Surveying (DDT 1413)

Competencies and Suggested Objectives	
1. Demonstrate the ability to use GPS equipment.	DDS1, DDS6, DDS8, DDS10
a. Define terminology.	(DOK1)
b. Transfer data between engineering software systems.	(DOK1)
2. Define and utilize data generated by geographical information systems (GISs).	DDS1, DDS6, DDS8, DDS10
a. Define how GPS is specifically designed for spatial analysis to fully analyze geographic data.	(DOK1)
b. Define GPS used in federal and state government, utilities, private engineering consulting firms, and corporations.	(DOK1)

STANDARDS

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DDS6	General Drafting Standards
DDS8	Pictorial View Standards and Terminology
DDS10	Computer/CADD Terminology

Related Academic Standards

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
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- A3 Data Interpretation (graph, table, chart, diagram)
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- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
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21st Century Skills

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- CS7 Critical Thinking and Problem Solving
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- CS9 Information Literacy
- CS10 Media Literacy
- CS11 ICT Literacy
- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

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Course Name: Pipe Drafting

Course Abbreviation: DDT 2523

Classification: Vocational–Technical Elective (Architectural Engineering Technology/Technician; General Drafting)

Description: Instruction in the basic knowledge needed to create process piping drawings using individual piping components (3 sch: 2-hr lecture, 2-hr lab)

Pre/Corequisites: Fundamentals of Drafting (DDT 1113) and Principles of CAD (DDT 1313)

Competencies and Suggested Objectives	
1. Define terms and pipe components.	DDST1, DDS2, DDS3, DDS6, DDS7
a. Define terms used in the piping industry.	(DOK1)
b. Identify and describe piping components utilized in industry.	(DOK1)
2. Draw process pipe drawings.	DDST1, DDS2, DDS3, DDS6, DDS7, DDS9, DDST0
a. Construct a plan view, right side view, and front view from an isometric pipe drawing.	(DOK2)
b. Develop views of a pipe drawing from given data.	(DOK1)
c. Create an isometric pipe drawing from plan and necessary views.	(DOK2)

STANDARDS

American Design Drafting Association Skills Design Standards

DDS1	General Drafting Terminology
DDS2	View Identification
DDS3	Dimensioning Standards and Terminology
DDS6	General Drafting Standards
DDS7	Manufacturing Processes and Welding
DDS9	Auxiliary View Standards, Definitions, and Terminology
DDS10	Computer/CADD Terminology

Related Academic Standards

R1	Interpret Graphic Information (forms, maps, reference sources)
R2	Words in Context (same and opposite meaning)
R3	Recall Information (details, sequence)
R4	Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
R5	Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
M1	Addition of Whole Numbers (no regrouping, regrouping)
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M3	Multiplication of Whole Numbers (no regrouping, regrouping)
M4	Division of Whole Numbers (no remainder, remainder)

- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
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21st Century Skills

- CS1 Global Awareness
- CS2 Financial, Economic, Business, and Entrepreneurial Literacy
- CS3 Civic Literacy
- CS4 Health Literacy
- CS5 Environmental Literacy
- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration
- CS9 Information Literacy
- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

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Course Name: Highway Drafting

Course Abbreviation: DDT 2533

Classification: Vocational–Technical Elective (Architectural Engineering Technology/Technician; General Drafting)

Description: A basic study of highway drafting; horizontal alignment of route surveys in the plan view, vertical alignment of route surveys in the profile view, typical sections, cross sections, and area calculations and estimation of quantities. (3 sch: 2-hr lecture, 2-hr lab)

Pre/Corequisites: Fundamentals of Drafting (DDT 1113) and Intermediate CAD (DDT 1323)

Competencies and Suggested Objectives	
1. Identify basic information for highway drafting.	DDS1, DDS2, DDS3, DDS4, DDS6, DDS10
a. Draw symbols and abbreviations.	(DOK1)
b. Identify and apply the use of the correct scale.	(DOK1)
c. Identify terms of land survey data.	(DOK1)
2. Draw horizontal and vertical alignment of route surveys.	DDS1, DDS2, DDS3, DDS4, DDS5, DDS6, DDS8, DDS10
a. Plot by bearing and by deflection angles.	(DOK2)
b. Reduce field notes.	(DOK2)
c. Establish grade and slope.	(DOK2)
3. Draw typical and cross sections.	DDS1, DDS2, DDS3, DDS4, DDS5, DDS6, DDS8, DDS10
a. Draw single and multiple roadways.	(DOK2)
b. Reduce and plot field notes.	(DOK2)
c. Superimpose typical sections.	(DOK2)

STANDARDS

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DDS3	Dimensioning Standards and Terminology
DDS4	Sections View Standards and Terminology
DDS5	Orthographic Projections Standards and Terminology
DDS6	General Drafting Standards
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DDS10	Computer/CADD Terminology

Related Academic Standards

- R1 Interpret Graphic Information (forms, maps, reference sources)
 R2 Words in Context (same and opposite meaning)

- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
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Course Name: Steel Ship Building and Design

Course Abbreviation: DDT 2543

Classification: Vocational–Technical Elective (General Drafting)

Description: Instruction in basic steel ship building and the process of ship design and planning (3 sch: 2-hr lecture, 2-hr lab)

Pre/Corequisites: Fundamentals of Drafting (DDT 1113)

Competencies and Suggested Objectives	
1. Develop a basic understanding of the shipbuilding industry.	DDS1, DDS6, DDS7
a. Identify and describe the different types of metal ships.	(DOK1)
b. Define terms associated with the shipbuilding industry.	(DOK1)
c. Differentiate between conventional ship construction and modular construction processes.	(DOK2)
d. Identify and describe the major parts of a ship, and discuss their relationship and function.	(DOK1)
e. Identify and describe various metals used in ship construction, and describe their uses.	(DOK1)
2. Develop drawings in the shipbuilding industry.	DDS1, DDS2, DDS3, DDS4, DDS5, DDS6, DDS7, DDS8, DDS9, DDS10
a. Compare and contrast the welding and riveting processes as related to shipbuilding.	(DOK2)
b. Draw and define welding symbols used in ship blueprints.	(DOK2)
c. Draw prints for different sections and features of a ship.	(DOK2)
d. Contrast manual and computerized methods for lofting of ship drawings.	(DOK2)

STANDARDS

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Related Academic Standards

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21st Century Skills

- CS1 Global Awareness
- CS5 Environmental Literacy
- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration
- CS9 Information Literacy
- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction

CS15 Productivity and Accountability
CS16 Leadership and Responsibility

SUGGESTED REFERENCES

Specific references for this course are provided by Northrop Grumman.

Course Name: Architectural Design II

Course Abbreviation: DDT 2623

Classification: Vocational–Technical Core (Architectural Engineering Technology/Technician; General Drafting Certificate); Vocational–Technical Elective (General Drafting Associate’s Degree)

Description: Emphasizes standard procedures and working drawings. Details involving architectural, mechanical, electrical, and structural drawings are covered, along with presentation of drawings and computer-aided design assignments. (3 sch: 1-hr lecture, 4-hr lab)

Pre/Corequisites: Architectural Design I (DDT 1613) and Intermediate CAD (DDT 1323) or by consent of instructor

Competencies and Suggested Objectives	
1. Create a set of custom working drawings. ^{DDSI1, DDS2, DDS3, DDS4, DDS5, DDS6, DDS10,} a. Develop and draw a plot plan. ^(DOK2) b. Design and draw a foundation plan and details. ^(DOK2) c. Design and draw a floor plan and schedules. ^(DOK2) d. Draw all four elevations. ^(DOK2) e. Design and draw cabinets and sectional views. ^(DOK2) f. Lay out and draw an electrical plan. ^(DOK2) g. Lay out and draw a heating and cooling plan. ^(DOK2)	
2. Develop a presentation drawing. ^{DDSI1, DDS2, DDS3, DDS4, DDS5, DDS6, DDS8, DDS9, DDS10} a. Construct a pictorial with rendering and landscaping. ^(DOK2) b. Construct a front elevation with rendering and landscaping. ^(DOK2) c. Construct a floor plan. ^(DOK2)	

STANDARDS

American Design Drafting Association Skills Design Standards

DDS1	General Drafting Terminology
DDS2	View Identification
DDS3	Dimensioning Standards and Terminology
DDS4	Sections View Standards and Terminology
DDS5	Orthographic Projections Standards and Terminology
DDS6	General Drafting Standards
DDS8	Pictorial View Standards and Terminology
DDS9	Auxiliary View Standards, Definitions, and Terminology
DDS10	Computer/CADD Terminology

Related Academic Standards

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
- M1 Addition of Whole Numbers (no regrouping, regrouping)
- M2 Subtraction of Whole Numbers (no regrouping, regrouping)
- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

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21st Century Skills

- CS1 Global Awareness
- CS2 Financial, Economic, Business, and Entrepreneurial Literacy
- CS3 Civic Literacy
- CS4 Health Literacy
- CS5 Environmental Literacy
- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration

- CS9 Information Literacy
- CS10 Media Literacy
- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

SUGGESTED REFERENCES

Books

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Web Sites

- Autodesk, Inc. (n.d.). *Autodesk*. Retrieved October 4, 2005, from <http://usa.autodesk.com/adsk/servlet/home?siteID=123112&id=129446>
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Course Name: Fundamentals of Multimedia

Course Abbreviation: DDT 2713

Classification: Vocational–Technical Elective (Architectural Engineering Technology/Technician; General Drafting)

Description: A general overview of current issues in multimedia; study of how multimedia can assist in the work environment; provides a basis for further study in multimedia design and production (3 sch: 1-hr lecture, 4-hr lab)

Pre/Corequisites: Architectural Design II (DDT 2623)

Competencies and Suggested Objectives	
1. Produce multimedia pictures using multimedia software with a scripted presentation. ^{DDST10}	
a. Define terms associated with multimedia. ^(DOK1)	
b. Sketch a layout of a multimedia presentation. ^(DOK1)	
c. Explain the use of the software. ^(DOK1)	
d. Develop a picture using the software. ^(DOK2)	
e. Compose a script. ^(DOK2)	
f. Make a presentation. ^(DOK2)	
2. Construct computer-generated animation. ^{DDST10}	
a. Define terms associated with computer-generated animation. ^(DOK1)	
b. Identify animation software. ^(DOK1)	
c. Create an animation storyboard. ^(DOK2)	
d. Prepare and present a computer-generated animation project. ^(DOK2)	
3. Create a home page. ^{DDST10}	
a. Identify terms associated with page production. ^(DOK1)	
b. Identify various creative software (i.e., Adobe Dreamweaver, Coffee Cup, etc.). ^(DOK1)	
c. Design a home page. ^(DOK2)	

STANDARDS

American Design Drafting Association Skills Design Standards

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DDS2	View Identification
DDS3	Dimensioning Standards and Terminology
DDS4	Sections View Standards and Terminology
DDS5	Orthographic Projections Standards and Terminology
DDS6	General Drafting Standards
DDS7	Manufacturing Processes and Welding
DDS8	Pictorial View Standards and Terminology
DDS9	Auxiliary View Standards, Definitions, and Terminology

Related Academic Standards

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- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
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- CS9 Information Literacy
- CS10 Media Literacy

- CS11 ICT Literacy
- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

SUGGESTED REFERENCES

Books

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- Seymour, R. D., Ritz J. M., & Cloghessy, F. A. (2000). *Exploring communication*. Tinley Park, IL: Goodheart-Willcox.
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- Shelly, G. B., Cashman, T. J., & Vermaat, M. E. (2006). *Microsoft Office 2003: Introductory concepts and techniques*. Albany, NY: Thomson Learning.
- Solomon, A. W. (2004). *Introduction to multimedia*. New York: Glencoe/McGraw-Hill.

Course Name: Special Project

Course Abbreviation: DDT 291 (1–3)

Classification: Vocational–Technical Core (General Drafting Certificate); Vocational–Technical Elective (Architectural Engineering Technology/Technician; General Drafting Associate’s Degree)

Description: Practical application of skills and knowledge gained in other drafting courses. The instructor works closely with the student to ensure that the selection of a project will enhance the student’s learning experience. (1–3 sch: 2- to 6-hr lab)

Pre/Corequisites: Consent of instructor

Competencies and Suggested Objectives	
1. Develop a written plan that details the activities and projects to be completed. ^{DDS1, DDS2, DDS3, DDS4, DDS5, DDS6, DDS7, DDS8, DDS9, DDS10}	
a. Utilize a written plan that details the activities and projects to be completed. ^(DOK2)	
b. Perform written occupational objectives in the special project. ^(DOK2)	
2. Assess accomplishment of objectives. ^{DDS1, DDS2, DDS3, DDS4, DDS5, DDS6, DDS7, DDS8, DDS9, DDS10}	
a. Prepare a weekly written assessment of accomplishment of objectives. ^(DOK2)	
b. Present weekly written reports of activities performed and objectives accomplished to the instructor. ^(DOK2)	
3. Utilize a set of written guidelines for the special project. ^{DDS1, DDS2, DDS3, DDS4, DDS5, DDS6, DDS7, DDS8, DDS9, DDS10,}	
a. Develop and follow a set of written guidelines for the special project. ^(DOK2)	

STANDARDS

Specific standards for this course will depend upon the nature of the problem under investigation.

SUGGESTED REFERENCES

Specific references for this course will depend upon the nature of the problem under investigation.

Course Name: Supervised Work Experience in Drafting and Design Technology

Course Abbreviation: DDT 292(1–6)

Classification: Vocational–Technical Elective (Architectural Engineering Technology/Technician; General Drafting)

Description: Cooperative program between industry and education designed to integrate the student’s technical studies with industrial experience. Variable credit is awarded on the basis of 1 semester hour per 45 industrial contact hours. (1–6 sch: 3- to 18-hr externship)

Pre/Corequisites: Consent of instructor and the completion of at least one semester of advanced course work in the drafting program

Competencies and Suggested Objectives	
1.	Apply technical skills needed to be a viable member of the workforce. <ol style="list-style-type: none"> Prepare a description of technical skills to be developed in the supervised work experience program. ^(DOK1) Develop technical skills needed to be a viable member of the workforce.
2.	Apply skills developed in other program area courses. <ol style="list-style-type: none"> Perform skills developed in other program area courses in the supervised work experience program. ^(DOK1)
3.	Apply human relationship skills. <ol style="list-style-type: none"> Use proactive human relationship skills in the supervised work experience program. ^(DOK1)
4.	Apply and practice positive work habits and responsibilities. <ol style="list-style-type: none"> Perform assignments to develop positive work habits and responsibilities. ^(DOK1)
5.	Work with the instructor and employer to develop written occupational objectives to be accomplished. <ol style="list-style-type: none"> Perform written occupational objectives in the supervised work experience program. ^(DOK1)
6.	Assess accomplishment of objectives. <ol style="list-style-type: none"> Prepare daily written assessment of accomplishment of objectives. ^(DOK1) Present weekly written reports of activities performed and objectives accomplished to the instructor. ^(DOK1)
7.	Utilize a set of written guidelines for the supervised work experience program. <ol style="list-style-type: none"> Develop and follow a set of written guidelines for the supervised work experience program. ^(DOK1)

STANDARDS

Specific references for this course will depend upon the nature of the problem under investigation.

SUGGESTED REFERENCES

Specific references for this course will depend upon the nature of the problem under investigation.

Geographical Information Systems Technology Option Courses

Course Name: Cartography and Computer Map Reading

Course Abbreviation: GIT 1253

Classification: Vocational–Technical Core (Geographical Information Systems Technology)

Description: An introduction to the preparation and interpretation of data in cartographic form and the use of computers for map compilation, design, and production; includes principles of global positioning (GPS), methods of map making, and principles of digital cartography (3 sch: 2-hr lecture, 2-hr lab)

Pre/Corequisites: Fundamentals of Geographical Information Systems (GIS) (GIT 2123)

Competencies and Suggested Objectives	
1.	Explain the principles and applications of global positioning systems (GPSs). <ul style="list-style-type: none"> a. Discuss the basic concepts and operations of a global positioning system. ^(DOK1) b. Demonstrate the use of the global positioning system to find latitude, longitude, and elevation. ^(DOK2) c. Demonstrate the use of the global positioning system to find state plane coordinates. ^(DOK2) d. Record location coordinates for a routing. ^(DOK1) e. Process data into X and Y coordinates. ^(DOK1)
2.	Describe and apply cartographic methodology. <ul style="list-style-type: none"> a. Describe and apply principles of cartography including construction of base maps and layering. ^(DOK2) b. Describe and apply principles of map design. ^(DOK2) c. Describe and apply methods of data conversion. ^(DOK2)

STANDARDS

Related Academic Standards

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
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- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
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- CS13 Initiative and Self-Direction
- CS14 Social and Cross-Cultural Skills
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

SUGGESTED REFERENCES

Books

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Course Name: Database Construction and Maintenance

Course Abbreviation: GIT 2113

Classification: Vocational–Technical Core (Geographical Information Systems Technology); Vocational–Technical Elective (Architectural Engineering Technology/Technician; General Drafting Associate’s Degree)

Description: A course designed to introduce database concepts and goals of database management systems, and relational, hierarchical, and network models of data. Methods for organizing data are introduced and discussed. (3 sch: 2-hr lecture, 2-hr lab)

Pre/Corequisites: None

Competencies and Suggested Objectives	
1.	Define database management concepts and goals. <ol style="list-style-type: none"> Describe how non-graphic attribute files will be structured. ^(DOK1) Perform manual data input. ^(DOK1)
2.	Define project layout and presentation of data. <ol style="list-style-type: none"> Describe how the project area will be subdivided and how GIS products will be presented. ^(DOK1) Convert existing data and manual input into project. ^(DOK1) Perform manual input and maintenance of the database. ^(DOK1)

STANDARDS

Related Academic Standards

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
- M1 Addition of Whole Numbers (no regrouping, regrouping)
- M2 Subtraction of Whole Numbers (no regrouping, regrouping)
- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)

- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
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- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS14 Social and Cross-Cultural Skills
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

SUGGESTED REFERENCES

Books

Microsoft Learning. (2005). *Microsoft official academic course: Microsoft Office Access 2003* (1st ed.). New York: McGraw-Hill.

Microsoft Learning. (2005). *Microsoft official academic course: Microsoft Office Excel 2003 core skills* (1st ed.). New York: McGraw-Hill.

Course Name: Fundamentals of Geographical Information Systems (GISs)

Course Abbreviation: GIT 2123

Classification: Vocational–Technical Core (Geographical Information Systems Technology); Vocational–Technical Elective (Architectural Engineering Technology/Technician; General Drafting Associate’s Degree)

Description: This course includes the use of computer mapping and databases in multiple applications. Included are incorporation of imagery and data into a graphical oriented database system. Also included are the fundamentals of geographical information systems techniques, approaches, and applications. (3 sch: 2-hr lecture, 2-hr lab)

Pre/Corequisites: None

Competencies and Suggested Objectives	
1. Identify the basic components of a geographical information system (GIS).	
a. Identify and define a geographical information system. ^(DOK1)	
b. Describe how GIS is used to collect, analyze, and present data. ^(DOK1)	
2. Explore careers in GIS.	
a. Describe GIS use in public and private agencies. ^(DOK1)	
b. Describe and compare the duties of a GIS manager, GIS database manager, cartographer, and GIS technician. ^(DOK1)	
3. Perform basic operations and procedures using GIS software.	
a. Define themes and layers, attributes, and other terms related to GIS. ^(DOK1)	
b. Define and compare vector data versus raster data. ^(DOK1)	
c. Create vector data using raster data. ^(DOK1)	

STANDARDS

Related Academic Standards

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
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SUGGESTED REFERENCES

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- United States Geological Survey. (2005). *USGS geographic data download*. Retrieved October 20, 2005, from <http://edc.usgs.gov/geodata/>

Course Name: Principles of Image Processing

Course Abbreviation: GIT 2133

Classification: Vocational–Technical Core (Geographical Information Systems Technology Associate’s Degree); Vocational–Technical Elective (Geographical Information Systems Technology Certificate; Architectural Engineering Technology/Technician; General Drafting Associate’s Degree)

Description: This course includes fundamentals of remotely sensed data including scale, feature identification, and symbolization. It includes fundamentals of interpretation techniques of various image products, including topographic and thematic maps, aerial photographs, sensor images, and satellite images. (3 sch: 2-hr lecture, 2-hr lab)

Pre/Corequisites: Remote Sensing (GIT 2273)

Competencies and Suggested Objectives	
1.	Explain how images are captured for use in GIS systems. <ol style="list-style-type: none"> Describe how data can be captured in analog form. ^(DOK1) Perform data collection in digital form. ^(DOK1) Perform data transfer of an aerial photograph to GIS. ^(DOK1)
2.	Digitize an aerial photograph (raster image) to a topographic map (vector image). <ol style="list-style-type: none"> Utilize computer software to convert raster images to vector images. ^(DOK1)
3.	Develop a CAD topographic map from an aerial photograph. <ol style="list-style-type: none"> Perform data collection from an aerial photograph. ^(DOK1) Prepare a topographic map using CAD software. ^(DOK2)

STANDARDS

Related Academic Standards

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
- M1 Addition of Whole Numbers (no regrouping, regrouping)
- M2 Subtraction of Whole Numbers (no regrouping, regrouping)
- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)

- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

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21st Century Skills

- CS1 Global Awareness
- CS5 Environmental Literacy
- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration
- CS9 Information Literacy
- CS10 Media Literacy
- CS11 ICT Literacy
- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

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Course Name: Advanced Geographical Information Systems

Course Abbreviation: GIT 2263

Classification: Vocational–Technical Core (Geographical Information Systems Technology); Vocational–Technical Elective (Architectural Engineering Technology/Technician; General Drafting Associate’s Degree)

Description: This is an integrated course that encompasses geographical data inputs, processing, analyses, and presentation. (3 sch: 1-hr lecture, 4-hr lab)

Pre/Corequisites: Database Construction and Maintenance (GIT 2113), Mapping and Topography for GIS (GIT 2423), or Mapping and Topography (DDT 2423)

Competencies and Suggested Objectives
<ol style="list-style-type: none"> 1. Plan, conduct, and present a GIS-based project. <ol style="list-style-type: none"> a. Prepare specifically designated project area database format for non-graphic attribute information. ^(DOK3) b. Prepare a designated project area base map. ^(DOK3) c. Perform linking of non-graphic map attribute data to graphic data in GIS. ^(DOK3) d. Perform manual input of non-graphic and graphic data. ^(DOK3) e. Prepare a report, and present findings. ^(DOK2)

STANDARDS

Related Academic Standards

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
- M1 Addition of Whole Numbers (no regrouping, regrouping)
- M2 Subtraction of Whole Numbers (no regrouping, regrouping)
- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)

- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

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21st Century Skills

- CS1 Global Awareness
- CS2 Financial, Economic, Business, and Entrepreneurial Literacy
- CS3 Civic Literacy
- CS4 Health Literacy
- CS5 Environmental Literacy
- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration
- CS9 Information Literacy
- CS10 Media Literacy
- CS11 ICT Literacy
- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS14 Social and Cross-Cultural Skills
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

SUGGESTED REFERENCES

Books

- Bolstad, P. (2002). *GIS fundamentals—A first text on geographic information systems*. White Bear Lake, MN: Elder.
- Clarke, K. C. (1999). *Getting started with geographic information systems*. Upper Saddle River, NJ: Prentice Hall.
- ESRI, Inc. (2005). *GIS getting started*. Retrieved October 20, 2005, from http://www.esri.com/getting_started/education/index.html

Ormsby, T., Napoleon, E., Burke, R., Groessl, C., & Feaster L. (2001). *Getting to know ArcGIS™ desktop*. Redlands, CA: ESRI.

Course Name: Remote Sensing

Course Abbreviation: GIT 2273

Classification: Vocational–Technical Core (Geographical Information Systems Technology); Vocational–Technical Elective (Architectural Engineering Technology/Technician; General Drafting Associate’s Degree)

Description: This course includes a discussion of a variety of remote sensing data collections methods. The course deals with manual interpretation data from photographs and other imagery. (3 sch: 1-hr lecture, 4-hr lab)

Pre/Corequisites: None

Competencies and Suggested Objectives	
1.	Explain principles of remote sensing data collection, interpretation, and applications. <ul style="list-style-type: none"> a. Select a project area for evaluation. ^(DOK1) b. Find a resource for project area image data. ^(DOK1) c. Inspect and process image data of project areas for target information. ^(DOK1) d. Explore other resources and methods of remote sensing. ^(DOK1)
2.	Demonstrate image interpretation. <ul style="list-style-type: none"> a. Perform aerial photograph interpretation using a stereoscope device. ^(DOK2) b. Perform aerial photograph interpretation using computerized methods. ^(DOK2) c. Perform satellite image interpretation using computerized methods. ^(DOK2)

STANDARDS

Related Academic Standards

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
- M1 Addition of Whole Numbers (no regrouping, regrouping)
- M2 Subtraction of Whole Numbers (no regrouping, regrouping)
- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)

- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

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21st Century Skills

- CS1 Global Awareness
- CS5 Environmental Literacy
- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration
- CS9 Information Literacy
- CS10 Media Literacy
- CS11 ICT Literacy
- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

SUGGESTED REFERENCES

Books

- Jensen, J. R. (2005). *Introductory digital image processing: A remote sensing perspective*. Upper Saddle River, NJ: Prentice Hall.
- Kavanagh, B. F. (2003). *Geomatics*. Upper Saddle River, NJ: Prentice Hall.
- Lillesand, T. M., Kiefer, R. W., & Chipman, J. W. (2004). *Remote sensing and image interpretation*. Hoboken NJ: Wiley.

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Short, N. M. (2010). *Dr. Nicholas Short's remote sensing tutorial*. Retrieved October 20, 2005, from <http://rst.gsfc.nasa.gov/>

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Course Name: Mapping and Topography for Geographical Information Systems

Course Abbreviation: GIT 2423

Classification: Vocational–Technical Core (Geographical Information Systems Technology Certificate); Vocational–Technical Elective (Geographical Information Systems Technology Associate’s Degree)

Description: Selected drafting techniques are applied to the problem of making maps, traverses, plot plans, plan drawings, and profile drawings using maps, field survey data, aerial photographs, and related references and materials including symbols, notations, and other applicable standardized materials. (3 sch: 2-hr lecture, 2-hr lab)

Pre/Corequisites: Elementary Surveying (DDT 1413) and Intermediate CAD (DDT 1323)

Competencies and Suggested Objectives	
1.	Plan and draw a map. <ol style="list-style-type: none"> Explain and draw a plan and profile. ^(DOK2) Define the various maps and symbols used in mapping. ^(DOK1) Prepare a contour map. ^(DOK2) Insert raster images into drawings. ^(DOK2)
2.	Transform field notes into engineering drawings. <ol style="list-style-type: none"> Explain an engineering drawing. ^(DOK1) Determine the correct scale size. ^(DOK1) Explain what information is needed from the field notes to complete a drawing. ^(DOK1) Complete a drawing from field notes. ^(DOK1)

STANDARDS

Related Academic Standards

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
- M1 Addition of Whole Numbers (no regrouping, regrouping)
- M2 Subtraction of Whole Numbers (no regrouping, regrouping)
- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)

- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

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21st Century Skills

- CS1 Global Awareness
- CS5 Environmental Literacy
- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration
- CS9 Information Literacy
- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS14 Social and Cross-Cultural Skills
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

SUGGESTED REFERENCES

- Dent, B. D. (1999). *Cartography: Thematic map design* (5th ed.). New York: McGraw-Hill.
- Krygier, J., & Wood, D. (2005). *Making maps: A guide to map design for GIS*. New York: Guilford.

Course Name: Special Problem in Geographical Information Systems Technology

Course Abbreviation: GIT 291(1–3)

Classification: Vocational–Technical Elective (Geographical Information Systems Technology)

Description: A course to provide students with an opportunity to utilize skills and knowledge gained in other Geographical Information Systems courses. The instructor and student work closely together to select a topic and establish criteria for completion of the project. (1–3 sch: 2- to 6-hr lab)

Pre/Corequisites: Consent of instructor

Competencies and Suggested Objectives	
1. Develop a written plan that details the activities and projects to be completed.	
a. Use a written plan that details the activities and projects to be completed.	(DOK1)
b. Perform written occupational objectives in the special problem.	(DOK1)
2. Assess accomplishment of objectives.	
a. Prepare daily written assessments of accomplishment of objectives.	(DOK1)
b. Present weekly written reports of activities performed and objectives accomplished to the instructor.	(DOK1)
3. Use and follow a set of written guidelines for the special problem.	
a. Develop and follow a set of written guidelines for the special problem.	(DOK1)

STANDARDS

Specific standards for this course will depend upon the nature of the problem under investigation.

SUGGESTED REFERENCES

Specific references for this course will depend upon the nature of the problem under investigation.

Course Name: Supervised Work Experience in Geographical Information Systems Technology

Course Abbreviation: GIT 292(1–6)

Classification: Vocational–Technical Elective (Geographical Information Systems Technology)

Description: A course to provide students with an opportunity to utilize skills and knowledge gained in other Geographical Information Systems courses. The instructor and student work closely together to select a topic and establish criteria for completion of the project. (1–3 sch: 2- to 6-hr lab)

Pre/Corequisites: Consent of instructor

Competencies and Suggested Objectives
1. Follow a set of instructor-written guidelines for the supervised work experience program.
2. Apply skills needed to be a viable member of the workforce. <ol style="list-style-type: none"> Prepare a description of skills to be developed in the supervised work experience program. ^(DOK1) Practice skills needed to be a viable member of the workforce. ^(DOK1)
3. Practice human relationship skills in the supervised work experience program.
4. Practice positive work habits, responsibilities, and ethics.
5. Develop written occupational objectives in the supervised work experience program.
6. Assess performance of occupational skills. <ol style="list-style-type: none"> Prepare daily written assessments of work performance as specified in the occupational objectives. ^(DOK1) Present weekly written reports to the instructor of activities performed and objectives accomplished. ^(DOK1)

STANDARDS

Specific standards for this course will depend upon the nature of the problem under investigation.

SUGGESTED REFERENCES

Specific references for this course will depend upon the nature of the problem under investigation.

Course Name: Work-Based Learning I, II, III, IV, V, and VI

Course Abbreviation: WBL 191(1–3), WBL 192(1–3), WBL 193(1–3), WBL 291(1–3), WBL 292(1–3), and WBL 293(1–3)

Classification: Vocational–Technical Elective

Description: A structured work-site learning experience in which the student, program area teacher, Work-Based Learning Coordinator, and work-site supervisor/mentor develop and implement an educational training agreement; designed to integrate the student’s academic and technical skills into a work environment; includes regular meetings and seminars with school personnel for supplemental instruction and progress reviews (1–3 sch: 3- to 9-hr externship)

Pre/Corequisites: Concurrent enrollment in vocational–technical program area courses

Competencies and Suggested Objectives	
1.	Apply technical skills and related academic knowledge needed to be a viable member of the workforce. <ul style="list-style-type: none"> a. Apply technical skills needed to be a viable member of the workforce. ^(DOK1) b. Apply skills developed in other related courses in a work-based setting. ^(DOK1) c. Perform tasks detailed in an educational training agreement at the work setting. ^(DOK1)
2.	Apply general workplace skills to include positive work habits and responsibilities necessary for successful employment. <ul style="list-style-type: none"> a. Demonstrate proactive human relationship skills in the work setting to include conflict resolution, team participation, leadership, negotiation, and customer/client service. ^(DOK1) b. Demonstrate time, materials, and resource management skills. ^(DOK1) c. Demonstrate critical-thinking skills such as problem solving, decision making, and reasoning. ^(DOK1) d. Demonstrate acquiring, evaluating, organizing, maintaining, interpreting, and communicating information. ^(DOK1) e. Demonstrate positive work habits and acceptance of responsibilities necessary for successful employment. ^(DOK1)

STANDARDS

Specific standards for this course will depend upon the nature of the problem under investigation.

SUGGESTED REFERENCES

Specific references for use in this course will depend upon the nature of the problem under investigation.

Recommended Tools and Equipment

CAPITALIZED ITEMS

1. CAD stations with Internet access (20 per instructor)
 - a. Current release AutoCAD
 - b. Mechanical design software with parametric
 - c. Third-party architectural software
 - d. Third-party civil software
 - e. Applications and multimedia software
2. Estimating software
3. Rendering software
4. Plotters (2)
5. Inkjet printers/laser printers (5)
6. Blueprint machine/large format copier (1)
7. Drafting tables with chairs (21)
8. Total station with data collector, software, and accessories (4)
9. Transits with tripods (1 per 4 students)
10. Levels with tripods (1 per 4 students)
11. A-E inkjet color plotter (1)
12. A-D scanner (1)

NON-CAPITALIZED ITEMS

1. Parallel bars (21)
2. Paper cutters (2)
3. CAD station desk with chairs (20)
4. Survey rods (1 per 4 students)
5. Range poles (1 per 4 students)
6. Chains, steel tapes S 100 ft or 200 ft (1 per 4 students)
7. Chaining pins, set of 11 with holder (1 set per 4 students)
8. Hammers (2 lb) (1 per 4 students)
9. Plumb bobs with holder and string (2 per 4 students)
10. Handheld two-way radios – rechargeable (1 set per 4 students)
11. Digital caliper, 6 in. (1)
12. Metal protractor, 6 in. (1)
13. Radius gauge set (1)
14. Thread gauge set, English (1)
15. Flat files (30)
16. GPS handheld units (5)
17. Surveying metal detector (1)
18. Dial calipers (1 per 4 students)

RECOMMENDED INSTRUCTIONAL AIDS

It is recommended that instructors have access to the following items:

1. Scientific calculator/construction calculator (1)
2. Cart, AV (for overhead projector) (1)
3. Cart, AV (for TV and VCR/DVD with data projector) (1)
4. Computer with operating software with multimedia kit and Internet access (1)
5. Inkjet/Laser printer
6. Projector, overhead (1)
7. TV monitor and VCR/DVD player (1)
8. Video/Audio data projector (1)
9. Laptop computer (1)
10. Digital camera/video camera (1)
11. Scanner (1)

Recommended Tools and Equipment Geographic Information Systems

1. Multimedia Pentium or Xeon computer with 2-GB RAM, CD/CD-R/DVD/DVD-R drive, 17-in. LCD ultrascan monitor, 80-GB hard drive, 256-MB integrated graphics card (1 per student)
2. A-E inkjet color plotter (1)
3. Color laser printer (1)
4. A-C desktop scanner (1)
5. ArcView GIS software or other industry-accepted software (1 per computer)
6. Microsoft Office Professional (current edition) (1 per computer)
7. Basic GPS unit with data download capability and cable (1 per 3 students)

RECOMMENDED INSTRUCTIONAL AIDS

Teachers should have access to the following:

1. Notebook computer with GPS receiver (1)
2. Projector, LCD (1)
3. Digital camera (1)

Assessment

Blueprint

This program is assessed using the MS-CPAS2. The following blueprint summary contains the competencies that are measured when assessing this program. Competencies are grouped into clusters, and a weight is given to each cluster to determine the number of items needed from each cluster. The numbers of C1s and C2s (item difficulty levels) are also indicated on the blueprint.

Please visit <http://info.rcu.msstate.edu/services/curriculum.asp> to download the blueprint that accompanies this curriculum.

Appendix A: American Design Drafting Association Skills Standards¹

DDS1	General Drafting Terminology
DDS2	View Identification
DDS3	Dimensioning Standards and Terminology
DDS4	Sections View Standards and Terminology
DDS5	Orthographic Projections Standards and Terminology
DDS6	General Drafting Standards
DDS7	Manufacturing Processes and Welding
DDS8	Pictorial View Standards and Terminology
DDS9	Auxiliary View Standards, Definitions, and Terminology
DDS10	Computer/CADD Terminology

¹ American Design Drafting Association. (2010). *Drafter certification examination as a competency program*. Newbern, TN: Author.

Appendix B: Related Academic Standards²

Reading

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)

Mathematics Computation

- M1 Addition of Whole Numbers (no regrouping, regrouping)
- M2 Subtraction of Whole Numbers (no regrouping, regrouping)
- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations

Applied Mathematics

- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)

Language

- L1 Usage (pronoun, tense, subject–verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)

Spelling

- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

² CTB/McGraw-Hill LLC. (2005). *Tests of adult basic education, forms 9 and 10*. Monterey, CA: Author. Reproduced with permission of CTB/McGraw-Hill LLC. TABE is a registered trademark of The McGraw-Hill Companies, Inc. Copyright © 2005 by CTB/McGraw-Hill LLC. Reproduction of this material is permitted for educational purposes only.

Appendix C: 21st Century Skills³

CSS1-21st Century Themes:

CS1 Global Awareness

1. Using 21st century skills to understand and address global issues
2. Learning from and working collaboratively with individuals representing diverse cultures, religions, and lifestyles in a spirit of mutual respect and open dialogue in personal, work, and community contexts
3. Understanding other nations and cultures, including the use of non-English languages

CS2 Financial, Economic, Business, and Entrepreneurial Literacy

1. Knowing how to make appropriate personal economic choices
2. Understanding the role of the economy in society
3. Using entrepreneurial skills to enhance workplace productivity and career options

CS3 Civic Literacy

1. Participating effectively in civic life through knowing how to stay informed and understanding governmental processes
2. Exercising the rights and obligations of citizenship at local, state, national, and global levels
3. Understanding the local and global implications of civic decisions

CS4 Health Literacy

1. Obtaining, interpreting, and understanding basic health information and services and using such information and services in ways that enhance health
2. Understanding preventive physical and mental health measures, including proper diet, nutrition, exercise, risk avoidance, and stress reduction
3. Using available information to make appropriate health-related decisions
4. Establishing and monitoring personal and family health goals
5. Understanding national and international public health and safety issues

CS5 Environmental Literacy

1. Demonstrating knowledge and understanding of the environment and the circumstances and conditions affecting it, particularly as relates to air, climate, land, food, energy, water, and ecosystems
2. Demonstrating knowledge and understanding of society's impact on the natural world (e.g., population growth, population development, resource consumption rate, etc.)
3. Investigating and analyzing environmental issues and making accurate conclusions about effective solutions
4. Taking individual and collective action toward addressing environmental challenges (e.g., participating in global actions, designing solutions that inspire action on environmental issues, etc.)

³ *21st century skills*. (n.d.). Washington, DC: Partnership for 21st Century Skills.

CSS2-Learning and Innovation Skills:

- CS6 Creativity and Innovation**
 1. Think Creatively
 2. Work Creatively with Others
 3. Implement Innovations
- CS7 Critical Thinking and Problem Solving**
 1. Reason Effectively
 2. Use Systems Thinking
 3. Make Judgments and Decisions
 4. Solve Problems
- CS8 Communication and Collaboration**
 1. Communicate Clearly
 2. Collaborate with Others

CSS3-Information, Media, and Technology Skills:

- CS9 Information Literacy**
 1. Access and Evaluate Information
 2. Use and Manage Information
- CS10 Media Literacy**
 1. Analyze Media
 2. Create Media Products
- CS11 ICT Literacy**
 1. Apply Technology Effectively

CSS4-Life and Career Skills:

- CS12 Flexibility and Adaptability**
 1. Adapt to Change
 2. Be Flexible
- CS13 Initiative and Self-Direction**
 1. Manage Goals and Time
 2. Work Independently
 3. Be Self-Directed Learners
- CS14 Social and Cross-Cultural Skills**
 1. Interact Effectively with Others
 2. Work Effectively in Diverse Teams
- CS15 Productivity and Accountability**
 1. Manage Projects
 2. Produce Results
- CS16 Leadership and Responsibility**
 1. Guide and Lead Others
 2. Be Responsible to Others