Drafting and Design Cluster
Mississippi Curriculum Framework

(Program CIP: 15.0101 – Architectural Engineering Technology)
(Program CIP: 15.1301 – General Drafting)
(Program CIP: 45.0702 – Geographical Information Systems)
(Program CIP: 15.1102 – Land Surveying)

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The Office of Curriculum and Instruction (OCI) was founded in 2013 under the Division of Workforce, Career, and Technical Education at the Mississippi Community College Board (MCCB). The office is funded through a partnership with The Mississippi Department of Education (MDE), who serves as Mississippi's fiscal agent for state and federal Career and Technical Education (CTE) Funds. The OCI is tasked with developing statewide CTE curriculum, programming, and professional development designed to meet the local and statewide economic demand.

Contents

ADOPTION OF NATIONAL CERTIFICATION STANDARDS

Architectural Engineering Technology & Drafting and Design

Currently there are no national certification standards offered for these programs; however, several Autodesk Certified User certification options are available to students enrolled.

For additional information, please visit certiport.com.

Geographical Information Systems

For the nature of this program, several Autodesk Certified User certification options are available to students enrolled as well as ArcGIS mapping platform software certifications.

For additional information, please visit certiport.com.

Land Surveying

The National Society of Professional Surveyors (NSPS) sponsors a comprehensive national certification program for survey technicians. The Certified Survey Technician Board (CST Board), which administers this program, recognizes the importance of technicians to the surveying and mapping profession.

This four-level certification program for surveying technicians throughout the United States indicates official recognition by NSPS that a person has demonstrated that he or she is minimally competent to perform surveying tasks at a specified technical level. Certification provides the individual with a sense of achievement, since it reflects advancement in the field of surveying. Certification also provides employers with a method of determining job assignments and advancement since certification is an indication of one's ability to perform specific job tasks.

Students who complete the Land Surveying program are eligible to pursue a Professional Surveyor License in the State of Mississippi. The program will prepare students for the Certified Survey Technician program sponsored by the National Society of Professional Surveyors (NSPS).

For additional information, please visit certiport.com.

INDUSTRY JOB PROJECTION DATA

Architectural Engineering Technology

Architectural engineering technology occupations require an education level of an Associate degree. The Bureau of Labor Statistics reports that there will be a 3.81% increase in job outlook at the regional level and a 7.58% increase at the state level. Median annual income for this occupation is $57,886.40 at both the regional and state level. A summary of occupational data from the Bureau of Labor Statistics Data Center and the State Workforce Investment Board data is displayed below (www. http://swib.ms.gov/DataCenter/):

Table 1: Education Level

Program Occupations	Education Level
Engineering technicians, except drafters, all other	Associate Degree

Table 2: Occupational Overview

	Region	State	United States
2010 Occupational Jobs	472	594	66100
2020 Occupational Jobs	490	639	69843
Total Change	18	45	3743
Total % Change	3.81%	7.58%	5.66%
2010 Median Hourly Earnings	$27.83	$27.83	$27.89
2010 Median Annual Earnings	$57,886.40	$57,886.40	$58,011.20
Annual Openings	1	4	374

Table 3: Occupational Breakdown

Description	2010 Jobs	2020 Jobs	Annual Openings	2010 Hourly Earnings	2010 Annual Earnings 2,080 Work Hours
Engineering technicians, except drafters, all other	472	490	1	$27.83	$57,886.40
TOTAL	**472**	**490**	**1**	**$27.83**	**$57,886.40**

Table 4: Occupational Change

Description	Regional Change	Regional % Change	State % Change	National % Change
Engineering technicians, except drafters, all other	18	3.81%	7.58%	5.66%

General Drafting

General drafting occupations require an education level of a postsecondary career and technical award. There is a projected 7.56% increase in occupational demand at the regional level and a 5.60% increase at the state level. Median annual income for these occupations is $48,375.60 at the regional level and $48,495.20 at the state level. A summary of occupational data from the State Workforce Investment Board Data Center is displayed below (www. http://swib.ms.gov/DataCenter/):

Table 1: Education Level

Program Occupations	Education Level
Architectural and civil drafters	Postsecondary Career and Technical Award
Electrical and electronics drafters	Postsecondary Career and Technical Award
Mechanical drafters	Postsecondary Career and Technical Award
Drafters, all other	Postsecondary Career and Technical Award

Table 2: Occupational Overview

	Region	State	United States
2010 Occupational Jobs	1178	1465	195230
2020 Occupational Jobs	1267	1547	203115
Total Change	89	82	7885
Total % Change	7.56%	5.60%	4.04%
2010 Median Hourly Earnings	$23.26	$23.32	$23.14
2010 Median Annual Earnings	$48,375.60	$48,495.20	$48,123.64
Annual Openings	8	8	788

Table 3: Occupational Breakdown

Description	2010 Jobs	2020 Jobs	Annual Openings	2010 Hourly Earnings	2010 Annual Earnings 2,080 Work Hours
Architectural and civil drafters	507	586	7	$20.34	$42,307.20
Electrical and electronics drafters	126	127	0	$22.05	$45,864.00
Mechanical drafters	475	483	0	$20.67	$42,993.60
Drafters, all other	70	71	0	$29.97	$62,337.60
TOTAL	**1178**	**1267**	**8**	**$23.26**	**$48,375.60**

Table 4: Occupational Change

Description	Regional Change	Regional % Change	State % Change	National % Change
Architectural and civil drafters	79	15.58%	9.39%	9.46%
Electrical and electronics drafters	1	0.79%	2.22%	1.61%
Mechanical drafters	8	1.68%	2.43%	-2.04%
Drafters, all other	1	1.43%	4.50%	1.97%

Geographical Information Systems

The geographical information systems' occupation requires an education level of work experience in the related field or a postsecondary career/technical certificate. There is a 10.73% increase projected in occupational demand at the regional level and a 15.51% increase at the state level. Median annual income for this occupation is $92,747.20 at the regional and state level. A summary of occupational data from the State Workforce Investment Board Data Center is displayed below (www. http://swib.ms.gov/DataCenter/):

Table 1: Education Level

Program Occupations	Education Level
Managers, all other	Work Experience in Related Field

Table 2: Occupational Overview

	Region	State	United States
2010 Occupational Jobs	1193	1625	337250
2020 Occupational Jobs	1321	1877	372217
Total Change	128	252	34967
Total % Change	10.73%	15.51%	10.37%
2010 Median Hourly Earnings	$44.59	$44.59	$46.37
2010 Median Annual Earnings	$92,747.20	$92,747.20	$96,449.60
Annual Openings	12	25	3496

Table 3: Occupational Breakdown

Description	2010 Jobs	2020 Jobs	Annual Openings	2010 Hourly Earnings	2010 Annual Earnings 2,080 Work Hours
Managers, all other	1193	1321	12	$44.59	$92,747.20
TOTAL	**1193**	**1321**	**12**	**$44.59**	**$92,747.20**

Table 4: Occupational Change

Description	Regional Change	Regional % Change	State % Change	National % Change
Managers, all other	128	10.73%	15.51%	10.37%

Land Surveying Technology

Land surveying technology occupations require an education level of a moderate-term on-the-job training. There is a 29.29% increase projected in occupational demand at the regional level and a 21.56% increase at the state level. Median annual income for this occupation is $28,808.00 at both the regional and state level. A summary of occupational data from the State Workforce Investment Board Data Center is displayed below (www. http://swib.ms.gov/DataCenter/):

Table 1: Education Level

Program Occupations	Education Level
Surveying and mapping technicians	Moderate-term on-the-job training

Table 2: Occupational Overview

	Region	State	United States
2010 Occupational Jobs	379	487	51650
2020 Occupational Jobs	490	592	61694
Total Change	111	105	10044
Total % Change	29.29%	21.56%	19.45%
2010 Median Hourly Earnings	$13.85	$13.85	$18.22
2010 Median Annual Earnings	$28,808.00	$28,808.00	$37,897.60
Annual Openings	11	10	1004

Table 3: Occupational Breakdown

Description	2010 Jobs	2020 Jobs	Annual Openings	2010 Hourly Earnings	2010 Annual Earnings 2,080 Work Hours
Surveying and mapping technicians	379	490	11	$13.85	$28,808.00
TOTAL	**379**	**490**	**11**	**$13.85**	**$28,808.00**

Table 4: Occupational Change

Description	Regional Change	Regional % Change	State % Change	National % Change
Surveying and mapping technicians	111	29.29%	21.56%	19.45%

ARTICULATION

Articulation credit from Secondary to Postsecondary will be awarded upon implementation of this curriculum by the college. Local agreements and dual credit partnerships are encouraged.

Articulated Secondary Course	Articulated Postsecondary Course
General Drafting (CIP: 15.1301)	DDT 1163 - Engineering Graphics

TECHNICAL SKILLS ASSESSMENT

Colleges should report the following for students who complete the program with a career certificate, technical certificate, or an Associate of Applied Science Degrees for technical skills attainment. To use the approved Alternate Assessment for the following programs of study, colleges should provide a Letter of Notification to the Director of Career Technical Education at the MS Community College Board. Please see the following link for further instructions: http://www.mccb.edu/wkfEdu/CTDefault.aspx.

CIP Code	Program of Study
15.0101	**Architectural Engineering Technology**
Level	**Assessment(s)**
Career	Autodesk AutoCAD Certified User **Optional Certifications** * Autodesk Revit Architecture Certified User or Autodesk Inventor Certified User or Certified SolidWorks Associate
Level	**Assessment(s)**
Technical/AAS	Autodesk Revit Architecture Certified User
CIP Code	**Program of Study**
15.1301	**General Drafting**
Level	**Assessment(s)**
Career	Autodesk AutoCAD Certified User **Optional Certifications** * Autodesk Inventor Certified User
Level	**Assessment(s)**
Technical/AAS	Autodesk AutoCAD Certified User **Optional Certifications** * Civil 3D Certified or Autodesk Inventor Certified User or Certified SolidWorks Associate or Autodesk Revit Architecture Certified User
CIP Code	**Program of Study**
45.0702	**Geographical Information Systems**
Level	**Assessment**
Career	N/A
Level	**Assessment**
Technical/AAS	ArcGIS Desktop – Entry Level Autodesk AutoCAD Certified User
CIP Code	**Program of Study**
15.1102	**Land Surveying**
Level	**Standard Assessment**
Career	Autodesk AutoCAD Certified User
Level	**Standard Assessment**
Technical/AAS	National Society of Professional Surveyors (NSPS)

***Colleges will select the optional certifications based on the demands of their industry.**

Online and Blended Learning Opportunities

Course content includes lecture and laboratory semester credit hours. Faculty members are encouraged to present lecture related content to students in an online or blended learning environment. Training related to online and blended learning will be available to faculty members through the MS Community College Board.

RESEARCH ABSTRACT

The curriculum framework in this document reflects the 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.

In the spring of 2021, the Office of Curriculum, Instruction, and Assessment met with faculty, administrators, and business and industry. Program faculty, administrators, and industry members were consulted regarding industry workforce needs and trends. An industry questionnaire was used to gather feedback concerning the trends and needs, both current and future, of their field.

REVISION HISTORY

2010 - Research & Curriculum Unit, Mississippi State University
2016 - Office of Curriculum & Instruction, Mississippi Community College Board
2021- Office of Curriculum, Instruction, and Assessment, Mississippi Community College Board

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.

Students who successfully complete a minimum of 30 semester hours in Drafting and Design Technology courses may earn a career certificate in the Drafting and Design cluster. Students who successfully complete a minimum of 45 semester hours in Drafting and Design Technology courses may earn a technical certificate in any program of study listed in the drafting and design cluster. Successful completion of a minimum of 60 semester credit hours of course work in a 2-year program leads to an Associate in Applied Science degree in General Drafting, Architectural Engineering, or Geographical Information Systems options. The Land Surveying option has a 60 semester credit hour Associate of Applied Science degree to prepare students to meet state licensure requirements.

The Drafting and Design cluster curricula allow students to obtain skills and knowledge related to several fields of the drafting and design industry. Programs of study 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.

Architectural Engineering Technology
The Architectural Technology option prepares a person for careers in the architectural drafting field as an Architectural Drafter or Architectural Designer or CAD Technician. This option will emphasize the design of residential as well as commercial fields. The program is designed to prepare graduates for employment in architectural firms, design/build firms, engineering firms and manufacturing facilities.

Geographical Information Systems
This program prepares students 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.

General Drafting
The General Drafting program of study is designed to provide instruction in all phases of design technology in order to prepare students for positions as designers or computer aided drafting technicians. Instruction includes computer aided design, architectural design, civil planning, 3D-modeling and manufacturing. A combination of class work and laboratory experience is stressed.

Land Surveying
The Land Surveying option prepares students for a career 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 students for the Certified Survey Technician (CST) program sponsored by the National Society of Professional Land Surveyors (NSPS).

SUGGESTED COURSE SEQUENCE-ARCHITECTURAL ENGINEERING TECHNOLOGY

Accelerated Pathway Credential/15 Hour Certificate

			SCH Breakdown			Contact Hour Breakdown		Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	Lecture	Lab	
DDT 1163	Engineering Graphics	3	2	2	60	30	30	
DDT 1313	Computer Aided Design I	3	2	2	60	30	30	
DDT 1213	Construction Standards and Materials	3	2	2	60	30	30	
	Instructor Approved Electives per Local Community College	6						
	TOTAL	**15**						

Career Certificate Required Courses

			SCH Breakdown			Contact Hour Breakdown		Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	Lecture	Lab	Certification Name
DDT 1163	Engineering Graphics	3	2	2	60	30	30	
DDT 1213	Construction Standards and Materials	3	3	0	45	45	0	
DDT 1313	Computer Aided Design I	3	2	2	60	30	30	Autodesk AutoCAD Certified User
DDT 1323	Computer Aided Design II	3	2	2	60	30	30	
DDT 1613	Architectural Design I	3	1	4	75	15	60	Autodesk Revit Architecture Certified
DDT 2373	3D Modeling	3	2	2	60	30	30	Autodesk Inventor Certified User OR Certified SolidWorks Associate
	Instructor Approved Electives per Local Community College	12						
	TOTAL	**30**						

Technical Certificate Required Courses

			SCH Breakdown			Contact Hour Breakdown		Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	Certification	Lab	Certification Name
DDT 2213	Structural Detailing I	3						
DDT 2243	Cost Estimating	3	3	0	45	45	0	
DDT 2623	Architectural Design II	3	2	2	60	30	30	Autodesk Revit Architecture Certified User*
	Instructor Approved Electives per Local Community College	6						
	TOTAL	**15**						

***Certification exam must be taken after DDT 1613 and DDT 2623.**

SUGGESTED COURSE SEQUENCE-GENERAL DRAFTING

Accelerated Pathway Credential/ 15 Hour Certificate

			SCH Breakdown			Contact Hour Breakdown		Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	Lecture	Lab	Certification Name
DDT 1163	Engineering Graphics	3	1	4	75		60	
DDT 1313	Computer Aided Design I	3	2	2	60		30	
DDT 1213	Construction Standards and Materials	3	2	2	60		30	
	Instructor Approved Electives per Local Community College	6						
	TOTAL	**15**						

Career Certificate Required Courses

			SCH Breakdown			Contact Hour Breakdown		Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	Lecture	Lab	Certification Name
DDT 1163	Engineering Graphics	3	1	4	75	15	60	
DDT 1173	Mechanical Design I	3	1	4	75	15	60	Autodesk Inventor Certified User
DDT 1213	Construction Standards and Materials	3	2	2	60	45	0	
DDT 1313	Computer Aided Design I	3	2	2	60	30	30	
DDT 1323	Computer Aided Design II	3	1	4	75	15	60	Autodesk AutoCAD Certified User
DDT 1613	Architectural Design I	3	1	4	75	15	60	
	Instructor Approved Electives per Local Community College	12						
	TOTAL	**30**						

Technical Certificate Required Courses

			SCH Breakdown			Contact Hour Breakdown		Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	Lecture	Lab	Certification Name
DDT 2153	Civil Planning and Design	3	1	4	75	15	6	Autodesk AutoCAD Civil 3D Certified
DDT 2373	3D Modeling	3	1	4	75	15	60	Autodesk Inventor Certified User OR Certified SolidWorks Associate
	Instructor Approved Math, Science or Technical Electives per Local Community	3						
	Instructor Approved Electives per Local Community College	6						
	TOTAL	**15**						

SUGGESTED COURSE SEQUENCE-GEOGRAPHICAL INFORMATION SYSTEMS

Accelerated Pathway Credential/ 15 Hour Certificate

			SCH Breakdown			Contact Hour Breakdown		Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	Lecture	Lab	Certification Name
DDT 1163	Engineering Graphics	3	2	2	60	30	30	
DDT 1313	Computer Aided Design I	3	2	2	60	30	30	
DDT 1413	Elementary Surveying	3	2	2	60	30	30	
	Instructor Approved Electives per Local Community College	6						
	TOTAL	**15**						

Career Certificate Required Courses

			SCH Breakdown			Contact Hour Breakdown		Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	Lecture	Lab	Certification Name
DDT 1163	Engineering Graphics	3	2	2	60	30	30	
DDT 1313	Computer Aided Design I	3	2	2	60	30	30	
DDT 1413	Elementary Surveying	3	1	4	75	15	60	
DDT 2713	Fundamentals of Multimedia`	3	1	4	75	15	60	
GIT 1253	Cartography and Computer Map Reading	3	2	2	60	30	30	
GIT 2113	Database Construction and Maintenance	3	2	2	60	30	30	
GIT 2123	Fundamentals of Geographical Information Systems (GIS)	3	2	2	60	30	30	
GIT 2263	Advanced Geographical Information Systems	3	1	4	75	15	60	
GIT 2273	Remote Sensing	3	1	4	75	15	60	
GIT 2423 DDT 2423	Mapping and Topography for GIS	3	2	2	60	30	30	
	TOTAL	**30**	**16**	**28**	**660**	**240**	**420**	

Technical Certificate Required Courses

			SCH Breakdown			Contact Hour Breakdown		Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	Lecture	Lab	Certification Name
GIT 2453	GPS/GIS Surveying	3	1	4	75	15	60	Autodesk AutoCAD Certified User ArcGIS Desktop Entry Level
GIT 2133	Principles of Imaging Processing	3	1	4	75	15	60	
GIT 2513	Advance Database Creations	3	1	4	75	15	60	
	Instructor Approved Electives per Local Community College	6						
	TOTAL	15						

GENERAL EDUCATION CORE COURSES- DRAFTING AND DESIGN CLUSTER

To receive the Associate of Applied Science Degree, a student must complete all of the required coursework found in the Career Certificate option, Technical Certificate option and a minimum of 15 semester hours of General Education Core. The courses in the General Education Core may be spaced out over the entire length of the program so that students complete some academic and Career Technical courses each semester or provided primarily within the last semester. Each community college will specify the actual courses that are required to meet the General Education Core Requirements for the Associate of Applied Science Degree at their college. The Southern Association of Colleges and Schools (SACS) Commission on Colleges Standard 2.7.3 from the Principles of Accreditation: Foundations for Quality Enhancement[1] describes the general education core.

Section 2.7.3 In each undergraduate degree program, the institution requires the successful completion of a general education component at the collegiate level that (1) is substantial component of each undergraduate degree, (2) ensures breadth of knowledge, and (3) is based on a coherent rationale. For degree completion in associate programs, the component constitutes a minimum of 15 semester hours or the equivalent. These credit hours are to be drawn from and include at least one course from the following areas: humanities/fine arts, social/behavioral sciences, and natural science/mathematics. The courses do not narrowly focus on those skills, techniques, and procedures specific to a particular occupation or profession.

General Education Courses

			SCH Breakdown			Contact Hour Breakdown		Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	Lecture	Lab	Certification Name
	Humanities/Fine Arts	3	3		45	45		
	Social/Behavioral Science	3	3		45	45		
	Math/Science	3	3		45	45		
	Other academic courses per local community college requirements for AAS degree.	6						
	Total	15						

[1] Southern Association of Colleges and Schools Commission on Colleges. (2012). *The principles of accreditation: Foundations for quality enhancement*. Retrieved from http://www.sacscoc.org/pdf/2012PrinciplesOfAcreditation.pdf

SUGGESTED COURSE SEQUENCE-LAND SURVEYING

Accelerated Pathway Credential/15 Hour Certificate

			SCH Breakdown			Contact Hour Breakdown		Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	Lecture	Lab	Certification Name
DDT 1163	Engineering Graphics	3	2	2	60	30	30	
DDT 1313	Computer Aided Design I	3	2	2	60	30	30	
DDT 1413	Elementary Surveying	3	2	2	60	30	30	
	Instructor Approved Electives per Local Community College	6						
	TOTAL	**15**						

Career Certificate Required Courses

			SCH Breakdown			Contact Hour Breakdown		Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	Lecture	Lab	Certification Name
DDT 1163	Engineering Graphics	3	2	2	60	30	30	
DDT 1313	Computer Aided Design I	3	2	2	60	30	30	Autodesk AutoCAD Certified User
DDT 1323	Computer Aided Design II	3	2	2	60	30	30	
DDT 1413	Elementary Surveying	3	1	4	75	15	60	
DDT 2153	Civil Planning and Design	3	2	2	60	30	30	
DDT 2423	Mapping and Topography	3	2	2	60	30	30	
DDT 2433	Legal Principles of Surveying I	3	3	0	45	45	0	
	Instructor Approved Technical, Math or Science Electives per Local Community College	9						
	TOTAL	**30**						

Technical Certificate Required Courses

			SCH Breakdown			Contact Hour Breakdown		Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	Lecture	Lab	Certification Name
DDT 2213	Structural Detailing I	3	2	2	60	30	30	
DDT 2443	Boundary Surveying	3	2	2	60	30	30	
DDT 2463	Legal Principles of Surveying II	3	3	0	45	45	0	
	Instructor Approved Technical, Math or Science Electives per Local Community College	6						
TOTAL		**15**						

General Education Core Courses- Land Surveying Option

To receive the Associate of Applied Science Degree, a student must complete all of the required coursework found in the Career Certificate option, Technical Certificate option and a minimum of 15 semester hours of General Education Core. The courses in the General Education Core may be spaced out over the entire length of the program so that students complete some academic and Career Technical courses each semester or provided primarily within the last semester. Each community college will specify the actual courses that are required to meet the General Education Core Requirements for the Associate of Applied Science Degree at their college. The Southern Association of Colleges and Schools (SACS) Commission on Colleges Standard 2.7.3 from the Principles of Accreditation: Foundations for Quality Enhancement[2] describes the general education core.

Section 2.7.3 In each undergraduate degree program, the institution requires the successful completion of a general education component at the collegiate level that (1) is substantial component of each undergraduate degree, (2) ensures breadth of knowledge, and (3) is based on a coherent rationale. For degree completion in associate programs, the component constitutes a minimum of 15 semester hours or the equivalent. These credit hours are to be drawn from and include at least one course from the following areas: humanities/fine arts, social/behavioral sciences, and natural science/mathematics. The courses do not narrowly focus on those skills, techniques, and procedures specific to a particular occupation or profession.

General Education Courses

			SCH Breakdown			Contact Hour Breakdown		Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	Lecture	Lab	Certification Name
	Humanities/Fine Arts	3	3		45	45		
	Social/Behavioral Science	3	3		45	45		
	Math/Science	3	3		45	45		
	Other academic courses per local community college requirements for AAS degree.	16						
	Total	25*						

*Additional academic hours required for state licensure.

[2] Southern Association of Colleges and Schools Commission on Colleges. (2012). *The principles of accreditation: Foundations for quality enhancement*. Retrieved from http://www.sacscoc.org/pdf/2012PrinciplesOfAcreditation.pdf

ELECTIVES- DRAFTING AND DESIGN CLUSTER

			SCH Breakdown				Contact Hour Breakdown			Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Clinical/ Intern	Total Contact Hours	Lecture	Lab	Clinical/ Intern	Certification Name
SSP 100(2-3)	Smart Start 101	2-3								
ACC 1213	Principles of Accounting I	3								
ACC 1223	Principles of Accounting II	3								
AGT 1163	Introduction to Spatial Information Systems	3								
AGT 1254	GNSS Data Collection	4								
AGT 1354	Remote Sensing	4								
AGT 2154	Geographic Information Systems I	4								
AGT 2174	Agricultural Geographic Information Systems	4								
ART 1313	Drawing I	3								
ART 1513	Computers in Art	3								
ATE 1113	Science and Technology	3								
BAD 1113	Introduction to Business	3								
BAD 2413	Legal Environment Business I	3								
BAD 2423	Legal Environment of Business II	3								
BAD 2723	Real Estate Law	3								
BOT 1133	Microcomputer Applications	3								
CCT 1113	Fundamentals of Drafting	3								
CCT 1213	Construction Materials	3								
CCT 2243	Cost Estimating	3								
CIT 1114	Route Surveying	4								
CIT 2113	Legal Principles of Surveying I	3								
CIT 2124	Boundary Surveying	3								
CIT 2444	GPS Surveying	3								
CIT 1223	Road Construction Plans and Specifications	3								
CSC 1123	Computer Applications I	3								
CSC 1123	Microcomputer Applications	3								

CTE 1143	Fundamentals of Construction Manufacturing	3								
DDT 2533	Highway and Road Design	3	2	2		60	30	30		
DDT 2693	Route Surveying and Design	3	2	2		60	30	30		
DDT 1123	Computational Methods for Drafting	3	2	2		60	30	30		
DDT 1173	Mechanical Design I	3	1	4		75	15	60		
DDT 1143	Geometric Dimensioning and Tolerances	3	2	2		60	30	30		
DDT 1153	Descriptive Geometry	3	1	4		75	15	60		
DDT 1213	Construction Standards and Materials	3	2	2		60	30	30		
DDT 1323	Intermediate CAD	3	2	2		60	30	30		
DDT 1413	Elementary Surveying	3	1	4		75	15	60		
DDT 1513	Blueprint Reading I	3	2	2		60	30	30		
DDT 1523	Blueprint Reading II	3	2	2		60	30	30		
DDT 1713	Fundamentals of Machining Processes	3	2	2		60	30	30		
DDT 1813	Design for Manufacturing	3	2	2		60	30	30		
DDT 1911	Drafting and Design Seminar I	1								
DDT 1921	Drafting and Design Seminar II	1								
DDT 1931	Drafting and Design Seminar III	1								
DDT 1941	Drafting and Design Seminar IV	1								
DDT 2123	Fundamentals of GIS	3								
DDT 2183	Mechanical Design II	3	2	2		60	30	30		
DDT 2213	Structural Detailing I	3	1	4		75	15	60		
DDT 2233	Structural Detailing II	3	1	4		75	15	60		
DDT 2243	Cost Estimating	3	2	2		60	30	30		
DDT 2253	Statics and Strength of Materials	3	2	2		60	30	30		
DDT 2263	Quality Assurance	3	2	2		60	30	30		
DDT 2273	Facilities Planning	3	2	2		60	30	30		
DDT 2343	Advanced CAD	3	1	4		75	15	60		
DDT 2373	3D Modeling	3	1	4		75	15	60		
DDT 2353	CAD Management	3	2	2		60	30	30		
DDT 2363	Computer Numerical Control	3	2	2		60	30	30		
DDT 2383	Fundamentals of CAD/CAM	3	2	2		60	30	30		

DDT 2423	Mapping and Topography	3	2	2		60	30	30		
DDT 2433	Legal Principles of Surveying I	3	2	2		60	30	30		
DDT 2443	Boundary Surveying	3	1	4		75	15	60		
DDT 2453	GPS Surveying	3	1	4		75	15	60		
DDT 2473	Electrical Engineering	3	1	4		75	15	60		
DDT 2483	Marine Engineering	3	1	4		75	15	60		
DDT 2513	Advance Database Construction	3	1	4		75	15	60		
DDT 2523	Pipe Drafting	3	2	2		60	30	30		
DDT 2533	Highway and Road Design	3	2	2		60	30	30		
DDT 2543	Steel Ship Building and Design	3	2	2		60	30	30		
DDT 2563	Introduction to Ship Building and Blueprint Reading	3	2	2		60	30	30		
DDT 2564	Marine Systems Integration	4	2	2		60	30	30		
DDT 2623	Architectural Design II	3	1	4		75	15	60		
DDT 2633	Pre-Engineered Metal Steel Building Drafting	3	2	2		60	30	30		
DDT 2643	Naval Architecture and Ship Structures	3	2	2		60	30	30		
DDT 2693	Route Surveying and Design	3								
DDT 2713	Fundamentals of Multimedia	3	1	4		75	15	60		
DDT 2723	Design Collaboration	3								
DDT 2753	Advanced 3D Modeling	3								
DDT 2813	Inventor 3D Modeling and Animation	3	2	2		60	30	30		
DDT 2823	Revit Architectural 3D Modeling	3	2	2		60	30	30		
DDT 2833	Portfolio	3	1	4		75	15	60		
DDT 2843	Marine Design Capstone	3	1	4		75	15	60		
DDT 291 (1-3)	Special Project in Drafting and Design Technology	1-3								
DDT 292 (1-6)	Supervised Work Experience in Drafting and Design Technology	1-6								
GIT 1253	Cartography and Computer Map Reading	3	2	2		60	30	30		
GIT 2113	Database Construction and Maintenance	3	2	2		60	30	30		

GIT 2123	Fundamentals of Geographical Information Systems	3	2	2		60	30	30		
GIT 2133	Principles of Image Processing	3	2	2		60	30	30		
GIT 2263	Advanced Geographical Information Systems	3	1	4		75	15	60		
GIT 2273	Remote Sensing	3	1	4		75	15	60		
GIT 2333	Introduction To ArcView (GIS)	3	2	2		60	30	30		
GIT 2423	Mapping and Topography for GIS	3	2	2		60	30	30		
GIT 2453	GPS/GIS Surveying	3	2	2		60	30	30		
GIT 2513	Advance Database Creations	3	2	2		60	30	30		
GIT 2913	Special Problem In Geo Info Systems	3	2	2		60	30	30		
GIT 2923	Supervised Work Experience In GIS	3	2	2		60	30	30		
IMM 1935	Manufacturing Skills Basic	5								
MMT 2513	Entrepreneurship	3								
MST 273 (4-6)	Fundamentals of CAD/CAM	4-6								
PHY 1113	Introduction to Astronomy	3								
DDT 2123	Fundamentals of Geographical Information Systems	3								
DDT 2693	Route Surveying and Design	3								
DDT 2533	Highway and Road Design	3								
WBL 191(1-3) WBL 192(1-3) WBL 193(1-3) WBL 291(1-3) WBL 292(1-3) WBL 293(1-3)	Work Based Learning	1-3			3-18	45-270			45-270	
	Instructor Approved Electives per Local Community College									

COURSE DESCRIPTIONS

DDT 1143 Geometric Dimensioning and Tolerances

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, run-out, and location of features on an object.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Manage dimensioning and tolerance symbols, terms, definitions, and concepts. AutoCAD Certified User
    a. Describe a feature control frame and its elements.
    b. Identify geometric characteristic symbols.
    c. List the material condition symbols, and describe their purposes.
    d. Define the term “basic dimensions.”
    e. Explain what the term “datum” implies.

2. Apply “geometric dimensioning and tolerance” on a drawing. AutoCAD Certified User
    a. Prepare a fully dimensioned drawing complete with geometric dimensioning and tolerancing.
    b. Interpret a basic feature control frame.
    c. Explain and interpret the effects of the modifiers on the tolerance zone.

National Standards

AutoCAD Certified User

DDT 1153 Descriptive Geometry

Description: This course contains theory and problems designed to develop the ability to visualize points, lines, and surfaces of space.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	1	4	75
3	2	2	60
3	3	0	45

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Develop principal and auxiliary views. [AutoCAD Certified User]
    a. Read and analyze a multi-view drawing by lines and surfaces.
    b. Construct top, front, and auxiliary adjacent views.

2. Solve problems of spatial relationships.
    a. Locate points and lines in space.
    b. Find true lengths and slopes of lines.
    c. Recognize parallel, intersecting, and perpendicular lines, and solve problems related to each.
    d. Draw lines in a prescribed direction.
    e. Locate points and lines in a plane.
    f. Solve slope, strike, and true size of plane problems.

3. Solve problems of lines, planes, and angles.
    a. Determine the intersection of a line and plane.
    b. Determine the intersection of two planes.
    c. Solve problems involving dihedral angles.
    d. Solve a basic revolution of a line and point problem.

National Standards

AutoCAD Certified User

DDT 1163 Engineering Graphics

Description: This course provides an introduction to fundamentals and principles of drafting to provide the basic background needed for all other drafting courses.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Discuss classroom procedures and drafting occupations.
    a. Describe proper classroom/lab procedures.
    b. Describe the various occupations in drafting and their requirements.

2. Apply proper techniques in technical drawings. AutoCAD Certified User
    a. Demonstrate the ability to scale drawings.
    b. Construct various angles.
    c. Recognize and construct the alphabet of lines.

3. Sketch and develop views of basic shapes.
    a. Develop a pictorial view from three principal views.
    b. Develop three principal views from a pictorial view.
    c. Complete three principal views when lines are missing.

4. Use geometric constructions. AutoCAD Certified User
    a. Construct tangent arcs and lines.
    b. Divide lines or arcs into equal and/or proportional parts.
    c. Develop geometric shapes.

5. Construct orthographic projections. AutoCAD Certified User
    a. Develop a top view, with front and right side views given.
    b. Develop a front view, with top and right side views given.
    c. Develop a right side view, with top and front views given.
    d. Construct a drawing consisting of three principal views.

6. Dimension objects. AutoCAD Certified User
    a. Recognize lines, symbols, features, and conventions used in dimensioning.
    b. Recognize and use size and location dimensions.
    c. Recognize and use general and local notes.
    d. Dimension a drawing using contour, chain, and baseline dimensioning.

7. Construct sectional views.
    a. Construct full and half sectional views.
    b. Recognize removed, revolved, offset, and aligned sectional views.

National Standards

AutoCAD Certified User

DDT 1173 Mechanical Design I

Description: Students will utilize techniques of modeling to create machine specific drawings. The course 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 industry procedures) used in mechanical design.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	1	4	75
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Discuss and identify basic machining processes. Inventor
    a. Define machining terminology.
    b. Recognize basic machining symbols.
    c. Identify basic manufacturing machines and tools.

2. Create drawings of fasteners. AutoCAD/Inventor
    a. Construct a drawing using fasteners from written descriptions and sketches.
    b. Represent different types and shapes of fasteners by following standard tables as to sizes, fits, and dimensions.
    c. Apply geometric dimensioning and tolerance (GD&T).

3. Prepare drawings for production. AutoCAD/Inventor
    a. Label a set of drawings with parts list, title block information, and drawing numbers.
    b. Create detailed drawings involving cams, gears, and pulleys from sketches and written descriptions.

4. Prepare welding drawings. AutoCAD/Inventor
    a. Identify the welding symbols used on welding prints.
    b. Create a drawing that will represent joint types, weld types, and welding symbols, using standard welding symbols.

National Standards

Autodesk Inventor Certified User
AutoCAD

DDT 1183 Technical Math

Description: This course focuses on the study of computational skills required for the development of accurate design and drafting methods.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60
3	3	0	45

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Demonstrate various measurement methods. Autodesk AutoCAD Certified User
    a. Measure distances, including metric and English measurements.
    b. Measure angles, including decimal degrees and degrees, minutes, and seconds.

2. Apply industry data. Autodesk AutoCAD Certified User
    a. Interpret graphs and charts.
    b. Manipulate gathered information.

3. Analyze complex geometric shapes. Autodesk AutoCAD Certified User
    a. Calculate area using metric and English systems.
    b. Calculate volume using metric and English systems.
    c. Solve geometric construction based on area/volume solutions.

4. Calculate trigometric values. Autodesk AutoCAD Certified User
    a. Calculate angle values of a triangle.
    b. Solve geometric construction based on angular solutions.

5. Calculate industry expenses.
    a. Prepare a cost analysis.
    b. Compute overhead expenses.

6. General mathematics.
    a. Use a calculator.
    b. Solve basic algebraic equations and conversions from fraction to decimal and metric.

National Standards

Autodesk AutoCAD Certified User

DDT 1213 Construction Standards and Materials

Description: This course introduces the standards and materials used in the construction process.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60
3	3	0	45

Pre-requisite: Instructor Approved

Student Learning Outcomes:

1. Utilize the MasterFormat divisions of the Construction Specifications Institute (CSI).

2. Describe the uses of wood components.
    a. Identify the different types of lumber used in construction and their design factors.
    b. Identify the different sizes of lumber used in construction and their design factors.

3. Describe concrete characteristics.
    a. Describe the use of common and special types of concrete.
    b. Classify aggregates.
    c. Explain how the design and control of concrete are maintained.
    d. Describe the psi rating system for concrete.
    e. Identify and describe common concrete and brick masonry units.
    f. Explain purposes of concrete additives.

4. Describe the use of bricks in construction.
    a. Describe different types of bricks.
    b. Describe the different types of brick bonds.
    c. Identify and describe the brick pattern bonds.
    d. Identify and describe the different mortar joints.

5. Describe various cover materials used in construction.
    a. Identify and describe the different types of exterior wall materials and their specific purposes.
    b. Identify and describe different types of insulating materials and their special purposes.
    c. Identify and describe the different types of floor coverings and their special uses.
    d. Identify and describe the different types of roofing materials.
    e. Identify and describe the different types of finishing materials and their special uses.
    f. Identify and describe different types of protective and decorative coatings and their special uses.

6. Discuss the various types and applications of metals in construction.

7. Discuss residential and/or commercial structures.
    a. Define architectural terms.
    b. Describe the planning areas.
    c. Identify and apply building codes.

DDT 1313 Computer Aided Design I

Description: This course is designed to develop basic operating system and drafting skills on CAD.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Manage the operating system. Autodesk AutoCAD Certified User
    a. Examine the contents of storage devices.
    b. List, erase, rename, and copy files on storage devices.
    c. Examine, create, remove, and move files between folders and subfolders.
    d. Access information services (e.g., Internet, e-mail, and networks).

2. Use the basic hardware of the CAD system. Autodesk AutoCAD Certified User, Autodesk Revit Architecture Certified User
    a. Input data using keyboard and graphics tablet, or mouse.
    b. Access files and/or symbols from the hard disk.
    c. Store, retrieve, copy, and delete drawings and files.

3. Draw a line using various point entry methods. Autodesk AutoCAD Certified User
    a. Draw a series of lines using absolute coordinates.
    b. Draw a series of lines using relative.
    c. Draw a series of lines using polar.
    d. Draw a series of lines using direct distance entry.

4. Manipulate drawing aids to increase accuracy and productivity. Autodesk AutoCAD Certified User
    a. Discuss grid mode.
    b. Discuss snap mode.
    c. Discuss polar tracking.
    d. Discuss the mode.
    e. Utilize object snap.
    f. Discuss object snap tracking.
    g. Utilize different object selection methods to be effective in the use of modify commands.

5. Establish line standards and layer concepts. Autodesk AutoCAD Certified User
    a. Create layers in accordance to ANSI Standards regarding line type and line weight.
    b. Manage layers.
    c. Copy layers and line types between drawings.

6. Create text styles and multiline text. Autodesk AutoCAD Certified User
    a. Revise text height.
    b. Revise text fonts.
    c. Utilize symbols.
    d. Create single line text.
    e. Create multiline text.
    f. Check spelling.

7. Utilize modify commands to improve efficiency. Autodesk AutoCAD Certified User
    a. Use the FILLET command to draw fillets, rounds and other radii.
    b. Place chamfers and angled corners using the CHAMFER command.
    c. Separate objects using BREAK command.
    d. Combine objects using the JOIN command.
    e. Edit objects using TRIM and EXTEND commands.
    f. Change objects using STRETCH and LENGTHEN commands.
    g. Edit the size of objects using the SCALE command. h. Use the EXPLODE command.
    i. Use the OFFSET command to create parallel lines.

8. Perform drafting functions on the CAD system. Autodesk AutoCAD Certified User
    a. Construct single-view and multi-view drawings. b. Modify or edit an existing drawing.
    c. Modify the existing system variables.

National Standards

Autodesk AutoCAD Certified User

Autodesk Revit Architecture Certified User

DDT 1323 Computer Aided Design II

Description: Continuation of Computer Aided Design I (DDT 1313). Subject areas include dimensioning, sectional views, and symbols.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Dimension drawings by the use of CAD. Autodesk AutoCAD Certified User
    a. Draw and dimension per industry standards.
    b. Apply dimensions using unidirectional and aligned systems of dimensions.

2. Draw sectional views in CAD. Autodesk AutoCAD Certified User
    a. Draw a multi-view drawing including a full section and apply section lining.
    b. Draw a multi-view drawing including a half section and apply section lining.
    c. Draw a multi-view drawing including an offset section and apply section lining.

3. Manipulate data between files. Autodesk AutoCAD Certified User
    a. Export drawing data/files.
    b. Import drawing data/files.
    c. Translate drawing data/files.
    d. Minimize file size.
    e. Utilize external reference files.

4. Develop a symbol library, and assign attributes. Autodesk AutoCAD Certified User
    a. Assign visible and hidden values to blocks.
    b. Create/Edit attributes in blocks and dynamic blocks.
    c. Construct a template file for the collection of block attributes.
    d. Collect attribute values of a bill of materials.

5. Execute various plots using layouts (paper space). Autodesk AutoCAD Certified User
    a. Create and manage view ports.
    b. Assign plotting scales to view ports.

National Standards

Autodesk AutoCAD Certified User

DDT 1413 Elementary Surveying
CIT 1413

Description: This is a basic surveying course that deals with principles of geometry, theory, and use of leveling instruments; calculations; the control and reduction of errors; and the understanding of land surveying history.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	1	4	75
3	2	2	60

Pre-requisite: Instructor Approved

Student Learning Outcomes:

1. Collect and record various measurements. NSPS
    a. Describe the use of the United States Geological Survey benchmark.
    b. Measure horizontal and vertical angles.
    c. Measure horizontal and vertical distances in English and metric measurements.
    d. Demonstrate differences in elevation between random points.
    e. Record and interpret field notes.
    f. Explain the various duties of each member of a survey party.

2. Use surveying equipment, terms, and communications. NSPS
    a. Identify and explain the basic surveying equipment.
    b. Set up the equipment, shoot elevations, and record.

3. Recall the history of land surveying.
    a. Describe the creation of the Public Land Survey System. NSPS
    b. Describe the History of Surveying in Mississippi.

National Standards

National Society of Professional Surveyor (NSPS) Certified Survey Technician Work Elements

1. **Types of Surveys (5)**
   Knowledge of the historical development of survey procedures and practices.

2. **Types of Surveys (10)**
   Knowledge of the different types of surveying and the basic differences between them.

3. **Field Equipment and Instruments (41)**
   Knowledge of the care, cleaning, and use of surveying tools and equipment, including field radios. Understand the names, purpose and parts, setup, transport and the need for calibration of various surveying field instruments. Some historical knowledge is required.

4. **Electronic Instruments (8)**
   Knowledge of the handling, setup, and care of electronic instruments and their accessories.

5. **Control Points: Horizontal & Vertical (6)**
   Knowledge of types of surveying control points and their differences.

7. **Survey Computations (50)**

Knowledge of mathematics and measurements relating to surveying (including linear, angular, elevations, and unit systems conversion).

9. **Field Notes (5)**
   Knowledge of the field duties of a Survey Technician. Such duty areas may include line clearing, establishing points, taping, leveling, and compass reading.

10. **First Aid and Safety**
    Basic knowledge of treatment practices for a variety of medical emergencies. Knowledge of traffic control and safety procedures for surveying and construction operations, including Occupational Safety and Health Administration (OSHA) standards.

DDT 1513 Blueprint Reading I

Description: Terms and definitions used in reading blueprints. Basic sketching, drawing, and dimensioning of objects will be covered.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60
3	3	0	45

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Use the basic drawing equipment and terms used in sketching and making drawings. Autodesk AutoCAD Certified User
    a. Identify terms, symbols, and lines used in blueprints.
    b. Utilize the basic equipment for sketching and/or drawing.

2. Interpret blueprints. Autodesk AutoCAD Certified User
    a. Identify the three basic views of a drawing.
    b. Identify the various lines used on drawings.
    c. Interpret dimensions and symbols.
    d. Interpret general and specific notes on drawings.
    e. Locate features on drawings.

National Standards

Autodesk AutoCAD Certified User

DDT 1523 Blueprint Reading II

Description: Continuation of Blueprint Reading I with emphasis placed on reading and interpreting blueprints for different types of structures and performing basic calculations.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60
3	3	0	45

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Identify members in a structure and their purposes.
    a. Read and specify framing span charts for floor joists, ceiling joists, and rafters.
    b. Identify a minimum of five types of roofs, and sketch them in a plan view.

2. Perform architectural calculations. Autodesk AutoCAD Certified User
    a. Calculate square footage, cubic yards, and board feet, and estimate quantities of the materials.
    b. Identify calculations related to commercial plans.

National Standards

Autodesk AutoCAD Certified User

DDT 1613 Architectural Design I

Description: This course is a study and development of architectural design principles for a residential and/or commercial structure utilizing a 2D or 3D application.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	1	4	75
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Plan a residential and/or commercial structure. AutoCAD/Revit
    a. Apply architectural terms.
    b. Utilize the planning areas.
    c. Identify and apply building codes.

2. Draw a set of working drawings for a residential and/or commercial. AutoCAD/Revit
    a. Select the correct scale for the different drawings.
    b. Draw a floor plan.
    c. Draw a set of exterior elevations.
    d. Draw a site plan.
    e. Draw an electrical plan.
    f. Draw interior elevations and details as needed.
    g. Create a window and door schedule.
    h. Draw necessary details and section views.
    i. Draw a foundation plan with details.

National Standards

Autodesk AutoCAD Certified User

Autodesk Revit Architecture Certified User

DDT 1713 Fundamentals of Machining Processes

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).

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60
3	3	0	45

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Identify and apply skills to basic machining processes.
    a. Describe the concept of interchangeable parts and their contribution to mass production.
    b. Discuss the manufacturing processes for a typical industry.
    c. Identify the major systems for measurement used in industry.
    d. Identify and demonstrate instruments and tools used to make measurements in industry.

2. Discuss the safe use of basic tools and machines.
    a. Identify and describe the safe use of common bench and hand tools.
    b. Discuss the safe use parts and accessories of machines.

DDT 1813 Design for Manufacturing

Description: Instruction in various methods of manufacturing with emphasis on the drafter's role in manufacturing.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60

Pre-requisite: Instructor Approved

Student Learning Outcomes:

1. Discuss different types of manufacturing processes.
    a. Describe different types of plastic processing.
    b. Describe different types of metal processing.

2. Apply manufacturing requirements to the design process. AutoCAD Certified User
    a. Apply association standards/guidelines to a design.
    b. Apply dimension/tolerance techniques according to the manufacturing process.
    c. Evaluate a design drawing as to conformance to manufacturing requirements.

National Standards

AutoCAD Certified User

DDT 2153 Civil Planning and Design

Description: This course deals with the development of civil planning and design processes.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Lay out and develop various sites. AutoCAD
    a. Explain and draw a plan and profile.
    b. Construct a contour map.
    c. Define the various maps and symbols used in mapping.
    d. Develop a plot plan.

2. Interpret field notes, and develop required drawings. AutoCAD
    a. Interpret an engineering drawing.
    b. Determine the correct scale size.
    c. Complete a drawing from field notes.

3. Demonstrate knowledge of site designs and layouts. AutoCAD
    a. Design and lay out parking lots.
    b. Design and lay out underground utilities.
    c. Understand grading and drainage.
    d. Identify zoning and ordinance requirements.

National Standards

AutoCAD

DDT 2183 Mechanical Design II

Description: A continuation of Mechanical Design I with emphasis on advanced techniques and knowledge employed in the planning of mechanical objects; includes instruction in the use of tolerances and dimensioning techniques.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Create drawings from a given mechanical part. Inventor
    a. Sketch the given part.
    b. Take and record measurements from the given part.
    c. Prepare a finished drawing.

2. Construct and design working drawings.
    a. Apply modification techniques.
    b. Interpret and apply geometric tolerances.

National Standards

Autodesk Inventor Certified User

DDT 2213 Structural Detailing I

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). Students will utilize 2D or 3D software.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	1	4	75
3	2	2	60

Pre-requisite: Instructor Approved

Student Learning Outcomes:

1. Utilize data on design of structural members.
    a. Identify and describe physical properties of materials.
    b. Identify structural members.
    c. Read and interpret data utilizing standard references.

2. Construct structural plans utilized in the structural engineering field. AutoCAD
    a. Draw a detail of connections of structural members.
    b. Draw structural framing plans.

3. Construct structural steel fabrication drawings. AutoCAD
    a. Define structural steel shop drawings.
    b. Define the structural steel fabrication details.
    c. Construct fabrication details for steel columns and beams.
    d. Utilize welding symbols.

National Standards

AutoCAD

DDT 2233 Structural Detailing II

Description: Study of the miscellaneous areas of structural detailing including stairs, handrails, and cage ladders.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	1	4	75
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Locate miscellaneous steel on architectural and structural design drawings.
    a. Using a set of construction drawings, highlight all instances of miscellaneous steel.
    b. Create a detailing estimate from a set of construction drawings.

2. Produce erection and shop drawings for miscellaneous steel items.
    a. Prepare a complete set of erection and fabrication drawings for a steel stair system, steel handrail system, and steel cage-ladder system.

DDT 2243 Cost Estimating

Description: Preparation of material and labor quantity surveys from actual working drawings and specifications

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60
3	3	0	45

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Prepare a cost estimate of an assigned building. AutoCAD Certified User (SqFt Questions)
    a. Define the different types of estimates and specific purposes of each.
    b. Prepare estimates of various kinds of foundations.
    c. Estimate wall, ceiling, and roof frames.
    d. Estimate exterior and interior finishes.
    e. Estimate sub-contract items.

2. Discuss the best construction methods based on project requirements.
    a. List the different types of construction in residential and commercial buildings.
    b. Discuss the best method of construction in residential and commercial buildings.

3. Discuss principles of contracts for construction.
    a. Identify and describe the essential elements of a contract.
    b. Describe how contracts are terminated.
    c. Describe different types of construction contracts and their specific purpose.
    d. List bidding procedures.

4. Complete a materials list for a structure.
    a. Describe the procedures of doing a materials list.
    b. Explain the purposes for a materials list.
    c. Complete a materials form for a construction project.

National Standards

AutoCAD Certified User

DDT 2253 Statics and Strength of Materials

Description: Study of forces acting on bodies; moments of forces; stress of materials; basic machine design; and beams, columns, and connections.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60
3	3	0	45

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Apply basic procedures for determining the behavior of structures under loads.
    a. Identify and solve force systems.
    b. Graphically solve and verify mathematical problems involving force systems.
    c. Read or use stress and strain curves.
    d. Calculate the results of tensile and compression loading.
    e. Calculate the elastic limit of materials.
    f. Calculate the ultimate strength of materials.

2. Determine the loadings of structures.
    a. Draw and calculate shear and moment diagrams.
    b. Calculate the loading, both live and static, on a simple structure.
    c. Draw and calculate the bending moment diagram.
    d. Draw and calculate the maximum bending moment.

DDT 2263 Quality Assurance

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.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	3	0	45
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Utilize basic quality assurance procedures.
    a. Discuss the history, development, and current trends of quality assurance and the use of quality circles.
    b. Describe the concept of probability.
    c. Compute the following measurements of central tendency: mean, median, and mode for a given set of data.
    d. Describe the frequency distribution for a normal population.
    e. Distinguish among the terms “accuracy,” “precision,” and “accuracy and precision.”
    f. Compute the standard deviation and the square of the residuals for a given set of data.

2. Effectively use sampling techniques. AutoCAD
    a. Describe the process of random sampling as applied to quality assurance.
    b. Compare single and multiple sampling plans.
    c. Describe the characteristics of the Mil. Std. 105D sampling plan.

3. Effectively use various charts.
    a. Describe the general theory of a control chart.
    b. Describe the development and use of fraction defective charts.
    c. Discuss special applications of control charts.
    d. Apply quality assurance procedures in a laboratory setting.

National Standards

Autodesk AutoCAD Certified User

DDT 2273 Facilities Planning

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.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Use applications of computer technology and techniques AutoCAD Certified User
    a. Use CAD for producing and editing prints of facility plans.
    b. Research the Internet for updated technology (i.e., software) for the design of facility plans.
    c. Prepare and run computer simulations to show product paths in the manufacturing facility.

2. Apply updated manufacturing techniques as they apply to the facility.
    a. Demonstrate work cells.
    b. Demonstrate group technology, and show how it applies to work cells.
    c. Demonstrate efficiencies of work cells with or without the use of group technology.

3. Design a facility around ergonomic and efficiency requirements.
    a. Demonstrate basic time and motion study and how it can be applied to facility planning.
    b. Demonstrate basic manufacturing processes for calculating product flow.
    c. Demonstrate balancing assembly lines, leveling workloads in manufacturing cells, and machine and personnel requirements.

4. Analyze efficiency, productivity, and profitability for calculating efficient department layout and material handling systems and flow paths.
    a. Demonstrate material, labor, and product flow.
    b. Demonstrate basic productivity and profitability calculations and how they are applied to layout planning.
    c. Demonstrate basic and advanced material handling systems and advantages/disadvantages of each.

National Standards

AutoCAD Certified User

DDT 2353 CAD Management

Description: Topics include technical and business aspects of CAD. Standards, customization, networking, Internet integration, and employee support will be covered.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Discuss CAD standards.
    a. Research the CAD standards of local industries.
    b. Prepare a documented set of CAD standards.

2. Customize the CAD environment to implement consistent CAD standards.
    a. Create a directory structure for the logical storage of CAD files.
    b. Change the CAD system settings to reflect documented CAD standards.

3. Manage the computer to assist the collaborative efforts of a work group.
    a. Set up user directories and groups.
    b. Assign rights to users and groups.
    c. Create shortcuts to work group files.

4. Create custom programs for repetitive tasks.
    a. Write and run a Visual Basic for Applications program.
    b. Use the CAD systems internal programming language to create a custom program.

DDT 2363 Computer Numerical Control (CNC) Drafting

Description: Basics of numerical control machines

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Identify the basic functions of CNC.
    a. List the advantages and disadvantages of CNC.
    b. Define terms related to CNC machines.

    2. Define the principles of the coordinate systems. Autodesk AutoCAD Certified User
    a. Define and discuss the Cartesian Coordinate System.
    b. Define and discuss the Absolute Coordinate System.
    c. Define and discuss the Incremental Coordinate System.

3. Identify the principles of the code system.
    a. Identify the common code words.
    b. Identify the common address formats.

4. Prepare and execute a basic CNC program.
    a. Compute the tool length and cutter radii compensation.
    b. Identify sub-programs.
    c. Write a program for milling linear and circular cuts.

National Standards

Autodesk AutoCAD Certified User

DDT 2373 3D Modeling

Description: This course will emphasize the user coordinate system and 3-D modeling.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	1	4	75
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Create 3-D solid models. Autodesk AutoCAD Certified User or Inventor or SolidWorks or REVIT
    a. Create models using model work flow.
    b. Create and render 3-D solid models.
    c. Create sections and 2D drawings from the 3D models.
    d. Create 3D rendered files for presentations.

2. Manipulate 3D rendered models. Autodesk AutoCAD Certified User or Inventor or SolidWorks or REVIT
    a. Manipulate basic shapes and primitives.
    b. Analyze 3D models.

National Standards

Autodesk AutoCAD Certified User or Autodesk Inventor Certified User or Certified SolidWorks Associate or Autodesk Revit Architecture Certified User

DDT 2383 Fundamentals of CAD/CAM

Description: This course is designed to provide the students with the fundamental knowledge and skills of Computer Aided Design Manufacturing using CAD/CAM software packages as they relate to Machine Tool Technology.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	1	4	75
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Develop a general understanding of fundamental CAD/CAM concepts.
    a. Describe the current industrial uses of CAD/CAM.
    b. Describe the major differences between Computer Aided Design and Computer Aided Manufacturing.
    c. List the major steps in Computer Aided Design.
    d. List the major steps in Computer Aided Manufacturing.

2. Perform basic operations using CAD/CAM software. Autodesk AutoCAD Certified User
    a. Create basic graphic objects: lines, circles, arcs, curves, solids, and surfaces.
    b. Modify objects with edit commands.
    c. Create and manipulate features (tool paths).
    d. Create and implement CNC programs.

National Standards

Autodesk AutoCAD Certified User

DDT 2423 Mapping and Topography

Description: Drafting techniques are applied to making maps including: site plan drawings, profile drawings using field survey data and aerial imagery. Related references and materials including symbols, notations, coordinate system selection, and other applicable standardized materials will be discussed.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Plan and draw a map. AutoCAD Certified User
    a. Explain and draw a plan and profile view of an area.
    b. Define the various maps and symbols used in mapping.
    c. Prepare a contour map.
    d. Insert raster images into drawings.
    e. Discuss the selection of coordinate systems based on map data.

2. Transform field notes/data into engineering drawings. AutoCAD Certified User
    a. Explain an engineering drawing.
    b. Determine the correct scale size.
    c. Explain what information is needed from the field notes to complete a drawing.
    d. Complete a drawing from field notes.

3. Transform field surveying data into a working plat.
    a. Define the state and federal (Alta) laws regarding plat creation/development
    b. Interpret legal descriptions.
    c. Transpose legal description into working drawing.
    d. Insert map elements per state standards.
    e. Gather/collect field data from reliable sources.
    f. Interpret and present field data in a professional format.

National Standards

AutoCAD Certified User

DDT 2433 Legal Principles of Surveying I CIT 2113

Description: The study of location, conveyance, ownership and transfer of real property under the laws of the State of Mississippi.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60
3	3	0	45

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Apply the legal aspects of surveying.
    a. Define legal terms as used in surveying.
    b. Describe the legal aspects of boundary control (Adverse Possession, Eminent Domain, statute of limitations).
    c. Write a legal description of real property.
    d. Research public records for property descriptions.

2. Comply with the technical standards for land surveying and land surveyor registration requirements set by the State of Mississippi.
    a. Discuss the legal authority and liability of the land surveyor.
    b. Apply code of ethics in work situations.
    c. Explain the surveyor's rights, duties, and liabilities.
    d. List the technical standards for land surveying in Mississippi.
    e. Discuss land surveying registration laws and examinations in Mississippi.

DDT 2443 Boundary Surveying

CIT 2124

Description: Land surveying course dealing practical applications of Boundary surveying as per State of Mississippi regulations. Course includes: Methods of determining boundary location and legal descriptions, researching record survey/description information, data collection and boundary stake-out.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Explore the history of the U.S. public land surveying system. NSPS
    a. Discuss the establishment of initial points.
    b. Discuss reestablishing section corners with single and double proportion methods.
    c. Explain the principle of convergence of meridians.

2. Make and record measurements. NSPS
    a. Chain a distance, record measurements, and make pertinent notes.
    b. Complete a level traverse circuit, record, and plot data.
    c. Read angular measurements and record data.
    d. Run a traverse requiring elevations, traverse points, and locations of major details.

3. Compute survey data. NSPS
    a. Compute horizontal curve from established data.
    b. Determine traverse computations.
    c. Calculate distances in a specified geographical area from field notes using appropriate geometric principles.

4. Complete a given survey. NSPS
    a. Survey a given area.
    b. Resurvey a given area to determine accuracy.
    c. Subdivide property using total stations and data collector.

5. Establish a true azimuth using celestial observation methods. NSPS
    a. Discuss the celestial sphere concept and its application.
    b. Discuss universal time.
    c. Determine an observer's longitude and latitude using celestial means.

National Standards

National Society of Professional Surveyor (NSPS) Certified Survey Technician Work Elements

5. **Control Points: Horizontal & Vertical (6)**

    Knowledge of types of surveying control points and their differences.

8. **Field Operations (21)**

    Knowledge of the field duties of a Survey Technician. Such duty areas may include line clearing, establishing points, taping, leveling, and compass reading.

DDT 2453 GPS Surveying

CIT 2444

Description: This course teaches principles of surveying utilizing artificial earth orbit satellites. It also includes GNSS/RTK, and federal standards.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	1	4	75
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Recall the fundamentals of GNSS Operation
    a. Define GPS/GNSS terminology.
    b. Review the theory of GNSS Operation.
    c. Identify coordinate systems and zones for GNSS
    d. Identify types of GNSS Systems

2. Operate GPS equipment.
    a. Set up and manipulate GPS equipment
    b. Define methods used in GPS surveying
    c. Practice GPS principles in a survey
    d. Analyze post-processed GPS data
    e. Give examples of errors and mistakes using GPS

DDT 2463 Legal Principles of Surveying II

Description: An advanced legal principles course with emphasis on the Rectangular System of Surveys (GLO) and Riparian and Littoral boundaries.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60
3	3	0	45

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Describe the history and application of the Rectangular Survey System.
   a. Analyzing and understanding original plats and field notes.
   b. Relate the difference between the various iterations of the Rectangular Survey System.
   c. Explain the history of Indian and State Boundaries in Mississippi.
   d. Use the latest Manual of Surveying Instructions rules and guidelines to solve boundary issues.

2. Define and analyze the legal aspects of water boundaries.
   a. Recall and apply the legal aspects of riparian boundaries.
   b. Examine riparian case law.
   c. Recall and apply the legal aspects of littoral boundaries.
   d. Examine littoral case law.

DDT 2523 Pipe Drafting

Description: Instruction in the basic knowledge needed to create process piping drawings using individual piping components. Students will utilize 2D or 3D software.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60
3	1	4	75

Pre-requisite: Instructor Approved

Student Learning Outcomes:

1. Define terms and pipe components.
    a. Define terms used in the piping industry.
    b. Identify and describe piping components utilized in industry.

2. Draw process pipe drawings. Autodesk AutoCAD Certified User
    a. Construct a plan view, right side view, and front view from an isometric pipe drawing.
    b. Develop views of a pipe drawing from given data.
    c. Create an isometric pipe drawing from plan and necessary views.
    d. Demonstrate proficiency in developing pipe drawings that include pumps, tanks and vessels.

National Standards

Autodesk AutoCAD Certified User

DDT 2533 Highway and Road Design

Description: A basic study of highway computer-aided design; 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 of materials used.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Identify basic information for highway drafting. NSPS or Autodesk AutoCAD Certified User
    a. Draw and introduce plans for street/highway construction.
    b. Draw and introduce specifications for street/highway construction.
    c. Identify and define the use of the correct scale.
    d. Read and interpret highway and site design plans.

2. Draw horizontal and vertical alignment of route surveys. NSPS
    a. Plot by bearing and by deflection angles.
    b. Reduce field notes.
    c. Establish grade and slope.

3. Draw typical and cross sections. NSPS or Autodesk AutoCAD Certified User
    a. Draw single and multiple roadways.
    b. Reduce and plot field notes.
    c. Superimpose typical sections.

4. Prepare a set of finished plans. NSPS

National Standards

National Society of Professional Surveyor (NSPS) Certified Survey Technician Work Elements

6. **Plan Reading (17)**

    Knowledge of the types of survey maps and the ability to obtain basic information from these maps.

Autodesk AutoCAD Certified User

DDT 2543 Steel Ship Building and Design

Description: Instruction in basic steel ship building and the process of ship design and planning.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Develop a basic understanding of the shipbuilding industry.
    a. Identify and describe the different types of metal ships.
    b. Define terms associated with the shipbuilding industry.
    c. Differentiate between conventional ship construction and modular construction processes.
    d. Identify and describe the major parts of a ship, and discuss their relationship and function.
    e. Identify and describe various metals used in ship construction, and describe their uses.

2. Develop drawings in the shipbuilding industry.
    a. Compare and contrast the welding and riveting processes as related to shipbuilding.
    b. Draw and define welding symbols used in ship blueprints.
    c. Draw prints for different sections and features of a ship.
    d. Contrast manual and computerized methods for lofting of ship drawings.

DDT 2563 Introduction to Steel Ship Building and Blueprint Reading

Description: This course provides instruction in basic steel ship building, blueprint reading and the process of ship design and planning.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Develop a basic understanding of the shipbuilding industry.
    a. Identify and describe the different types of metal ships.
    b. Define terms associated with the shipbuilding industry.
    c. Differentiate between conventional ship construction and modular construction processes.
    d. Identify and describe the major parts of a ship, and discuss their relationship and function.
    e. Identify and describe various metals used in ship construction, and describe their uses.

2. Develop drawings in the shipbuilding industry.
    a. Compare and contrast the welding and riveting processes as related to shipbuilding.
    b. Draw and define welding symbols used in ship blueprints.
    c. Draw prints for different sections and features of a ship.
    d. Contrast manual and computerized methods for lofting of ship drawings.

3. Use the basic drawing equipment and terms used in sketching and making drawings.
    a. Identify terms, symbols, and lines used in blueprints for various disciplines.
    b. Utilize the basic equipment for sketching and/or drawing.

4. Interpret blueprints.
    a. Identify the three basic views of a drawing.
    b. Identify the various lines used on drawings.
    c. Interpret dimensions and symbols.
    d. Interpret general and specific notes on drawings.
    e. Locate features on drawings.

DDT 2623 Architectural Design II

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.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	1	4	75
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Create a set of custom working drawings. Autodesk AutoCAD Certified User
    a. Develop and draw a plot plan.
    b. Design and draw a foundation plan and details.
    c. Design and draw a floor plan and schedules.
    d. Draw all four elevations.
    e. Lay out and draw an electrical plan.
    f. Lay out and draw a heating and cooling plan.
    g. Lay out and draw stairs.

2. Develop a presentation drawing. Autodesk AutoCAD Certified User
    a. Construct a pictorial with rendering and landscaping.
    b. Construct a front elevation with rendering and landscaping.
    c. Construct a floor plan.

3. Discuss ADA Requirements.

4. Discuss Energy-Efficient products and trends.

National Standards

Autodesk AutoCAD Certified User

DDT 2633 Pre-Engineered Metal Steel Building Drafting

Description: This course provides a basic understanding of a metal building system design and its incorporation into architectural engineering documents.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	1	4	75
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Interpret metal building designs.
    a. Identify members of a metal building system.
    b. Identify the different rigid frame types.
    c. Identify the different secondary framing members.
    d. Identify the different sheathing options.

2. Develo a set of plans and details. Autodesk AutoCAD Certified User
    a. Draw a framing plan.
    b. Draw an anchor bolt layout.
    c. Draw section views.
    d. Draw an expandable/nonexpendable endwall.

3. Create a part/material list.
    a. Create a materials list for the building.
    b. Create a building cost estimate.

National Standards

Autodesk AutoCAD Certified User

DDT 2643 Naval Architecture and Ship Structures

Description: This course provides an in-depth insight to the overall shipbuilding process. It begins with a brief history of shipbuilding and proceeds into the shipbuilding processes, the types of steel used in ship manufacturing, welding and testing processes used in ship construction and integration of various components into a functional vessel.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Explain the basic design of a ship including the ship dimensions, form, size or category.
    a. Explain the progression of design through the three stages.
    b. Describe the effect waterway restrictions have on the ship's design.
    c. Discuss the basics of displacement as it applies to a ship.
    d. Differentiate between lightweight and deadweight and their effects on ship displacement.
    e. Explain the contract process in purchase of a new vessel.

2. Contrast hull forms of ships from 1940-1970 as compared to modern day ships.
    a. Describe and distinguish among oil tankers, bulk carriers, car carriers, RO/RO, and container ships.
    b. Describe modern day cargo handling equipment.

3. Explain the purpose of a Classification Society.
    a. List the Classification Societies that are full members of IACS.
    b. Compare IACS members of Lloyds Register to the American Bureau of Shipping (ABS).

4. Explain the various processes used to make steel.
    a. Describe the common steel alloys and/or grades of steel used in the defense industry.
    b. List and define the methods used in heat treating steels
    c. Differentiate between steel plates and steel shapes.
    d. Distinguish between stress and strain as applied during material testing.
    e. Describe the "tensile" test and its application to steel shipbuilding.
    f. Explain the Charpy V Notch test and its purpose.

5. Compare and contrast the stresses to which a ship is subject.
    a. Describe how the weight and buoyancy of a ship applies to the displacement of water.
    b. Differentiate between "hogging" and "sagging" of a ship's hull.
    c. Describe the application of bending moments in shaping the hull of a ship.
    d. Identify and differentiate between local and transverse stresses.
    e. Describe the interrelationship between stresses and strength members within a ship.
    f. List and explain the structural failures.

6. Explain the welding processes used in building DOD ships.
    a. Describe the electric arc welding process as it applies to welding electrodes.

b. Differentiate among down hand, horizontal vertical, vertical, and overhead welding processes.
c. Describe the arc welding processes used in shipbuilding:
    1. Flux Cored Arc Welding (FCAW)
    2. Submerged Arc Welding (SAW)
    3. Tungsten Insert Gas (TIG)
    4. Metal Insert Gas (MIG)
d. State the purpose of fluxes and shielding gasses used in welding.

7. Explain the welding and cutting processes of structural steel used in building DOD ships. Contrast hull forms of ships from 1940-1970 as compared to modern day ships.
    a. Describe the gouging process.
    b. Explain a butt welded joint and the types of edge preparations.
    c. Describe the various types of edge preparations and their purpose.
    d. Discuss the welding methods.
        1. Butt welded joint
        2. Tack Welds
        3. Backstep
        4. Wandering
    e. State the purpose of testing welds.

8. Explain the interaction of the ship drawing office with development of the product model.
    a. Explain the different types of plans/drawings.
        1. Lines
        2. Expansion
    b. Describe the use of CAD/CAM in developing the Ship Product Model.
    c. Describe the moldloft process.
    d. Discuss the nesting and identification of piece parts as material is cut during construction.

9. Describe the process of plate, section preparation, and machining.
    a. Explain how plates and materials are handled in the machine shops.
        1. Shot blasting process performed in a wheel-a-brator.
        2. Plate profiling machines and methods
        3. Planning machines and methods
        4. Drilling machines
        5. Guillotines/shears
        6. Presses/hydraulic
        7. Use of plate rolls for rolling shell plates b. Discuss the various bending processes.
        8. Heat line
        9. Frame
        10. Cold Frame
    c. Describe the uses of robotics in shipbuilding.
    d. Explain the plate profiling machines and methods.
    e. Develop drawings in the shipbuilding industry.

10. Understand the prefabrication and launching processes.
    a. Compare and contrast prefabrication of module versus block style of construction.
        1. Sub-assemblies
        2. Unit Fabrication
    b. List and explain the advantages of pre-outfitting modules during the construction process.
    c. Describe the Ship lift/floating dry dock used to launch ships.
    d. Explain the purpose of the Engineering Test & System Assurance (ETSA) memo for launching a ship and the ETSA memo stern release handout.

11. Understand the prefabrication and launching processes.
    a. Describe the general layout of a shipyard.

b. Explain the flow of materials in constructing a ship.
c. Describe the Ship lift/floating dry dock used to launch ships.
d. Summarize the current steps and processes entailed in building ships.

DDT 2664 Marine Systems Integration

Description: The content of this course was developed for a designer apprentice position. This course will place an emphasis on the integration of hull and marine systems into a complete vessel package. The design and analysis of general guidance, hull structure, propulsion, electrical, command and surveillance, auxiliary systems, outfitting and furnishing and annament are investigated. Included is the study of equipment installation, plating, bulkheads, propulsion systems, power generation, and combat systems, HVAC and weapons management.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
4	4	0	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Demonstrate an understanding of the various roles of the marine industry designer as it relates to the following areas.
    a. The major systems that comprise the complete vessel package.
    b. The operation of the components that make up these systems.
    c. The inter-relationship between the varying systems that support ship operation.
    d. An exposure to various engineering laws and principles that are used to design and engineer these major systems.
    e. An increased ability to interact with designers and engineers from various system and engineering disciplines.

DDT 2693 Route Surveying and Design

Description: A real world application of route surveying including construction stakeout. Stakeout applications include: horizontal and vertical alignment of route surveys, typical sections, cross sections, cut/fill calculations, and area calculations.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Generate and apply a highway construction stake out plan.
    a. Read stakeout plans for street/highway and site construction.
    b. Interpret and stakeout plans for street/highway and site construction.

2. Compute and stake grade/elevations.
    a. Utilize a GPS.
    b. Utilize differential leveling.
    c. Utilize an electronic distance meter.

DDT 2713 Fundamentals of Multimedia

Description: A general overview of current issues in multimedia and the study of how multimedia can assist in the work environment. This course provides a basis for further study in multimedia design and production.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Produce multimedia pictures using multimedia software with a scripted presentation.
    a. Define terms associated with multimedia.
    b. Sketch a layout of a multimedia presentation.
    c. Explain the use of the software.
    d. Develop a picture using the software.
    e. Compose a script.
    f. Make a presentation using Google Sketchup and/or any other digital media software.

2. Construct computer-generated animation.
    a. Define terms associated with computer-generated animation.
    b. Identify animation software.
    c. Create an animation storyboard.
    d. Prepare and present a computer-generated animation project.

3. Create a home page.
    a. Identify terms associated with page production.
    b. Identify various creative software (i.e., Adobe Dreamweaver, Coffee Cup, etc.).
    c. Design a home page with various software.

DDT 2723 Design Collaboration

Description: Practical application of skills and knowledge gained in other drafting courses. Explore team space and the package timeline. Create, explore, and consume packages. Compare changes between software packages.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Define a collaboration possibilities.

2. Recognize ways to effectively work with design data across multiple software platforms.
    a. Import various software files.

3. How to manage CAD data.
    a. Learn how to invite and manage team members.
    b. Learn how to convert a model to a cloud model.
    c. Learn how to publish models for various soft wares.

4. How to collaborate on designs across multiple software stages in an efficient way.

5. Prepared data for production interfacing with various software's used.

DDT 2753 Advanced 3D Modeling

Description: This course will provide instruction on the 3D applications. It emphasizes the development of 3D parametric models and the ability to generate 2D drawings, details and renderings from the model.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Manage software interface.
    a. Understand feature based modeling.
    b. Create and select projects.

2. Create 2D sketching, constraints and base features.
    a. Create 2D sketches constraining and dimensioning sketches.
    b. Generate/print 2D sketches.

3. Create 3D models from 2D sketches/part modeling and editing 3D features.
    a. Customize the CAD environment to implement consistent CAD standards.
    b. Create secondary sketches and work planes.
    c. Add features to 3D model.

4. Create working 2D drawings from 3D models.
    a. Create layout and drawing views.
    b. Create sections and 2D drawings from the 3D models.
    c. Demonstrate an understanding of dimensioning and annotating.

5. Create assemble, rendering and motion constraints.
    a. Demonstrate knowledge of rendering components and process.
    b. Demonstrate knowledge of animation components, constraints and camera.
    c. Create 3D rendered files for presentations.

DDT 2813 Inventor 3D Model and Animation

Description: This course will provide instruction on the 3D applications of Inventor. It emphasizes the development of 3D parametric models and the ability to generate 2D drawings, details and renderings from the model. This course will also provide the utilization of assembly drawings and animation of working parts.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	1	4	75
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Manage Inventor Interface. Autodesk Inventor Certified User
    a. Create part files.
    b. Understand feature based modeling.
    c. Create and select projects.

2. Create 2D Sketching, constraints and base features. Autodesk Inventor Certified User
    a. Create 2D sketches constraining and dimensioning sketches.
    b. Generate/print 2D sketches.
    c. Create manufacturing documents and part lists.

3. Create 3D models from 2D sketches / part modeling and editing 3D features. Autodesk Inventor Certified User
    a. Customize the CAD environment to implement consistent CAD standards.
    b. Create secondary sketches and work planes.
    c. Add features to 3D model.

4. Create working 2D drawings from 3D models. Autodesk Inventor Certified User
    a. Create layout and drawing views.
    b. Create alternate views.
    c. Demonstrate an understanding of dimensioning and annotating.

5. Create assembly, rendering and motion constraints. Autodesk Inventor Certified User
    a. Create parts and features in assemblies.
    b. Place and constrain parts in assemblies.
    c. Demonstrate knowledge of motion constraints and assemblies.
    d. Demonstrate knowledge of rendering components and process.
    e. Demonstrate knowledge of animation components, constraints and camera.

National Standards

Autodesk Inventor Certified User

DDT 2823 Revit Architecture

Description: This course provides instruction on the 3D applications of Revit Architecture. It emphasizes the development of 3D parametric models and the ability to generate 2D drawings, details and renderings from the model. This course will also provide the animation walk thru of the 3D building.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	1	4	75
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Understand BIM and Revit Architecture. Autodesk Revit Architecture Certified User
    a. Build information modeling.
    b. Discuss standard terminology.
    c. Start projects and commands

2. Understand basic drawing and editing tools. Autodesk Revit Architecture Certified User
    a. Use general drawing tools.
    b. Use editing elements.
    c. Use basic modifying tools.

3. Create 3D building models. Autodesk Revit Architecture Certified User
    a. Set up levels and import CAD files.
    b. Create grids and columns.
    c. Create model using walls, floors, doors, windows and roofs.
    d. Create custom components.

4. Create working 2D drawings from 3D models. Autodesk AutoCAD Certified User
    a. Create Setting sheets for plotting plans and details.
    b. Use dimensioning and annotation.

National Standards

Autodesk AutoCAD Certified User

Autodesk Revit Architecture Certified User

DDT 291(1-3) Special Project

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.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
1		2	30
2		4	60
3		6	90

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Develop a written plan that details the activities and projects to be completed.
    a. Utilize a written plan that details the activities and projects to be completed.
    b. Perform written occupational objectives in the special project.

2. Assess accomplishment of objectives.
    a. Prepare a weekly written assessment of accomplishment of objectives.
    b. Present weekly written reports of activities performed and objectives accomplished to the instructor.

3. Utilize a set of written guidelines for the special project.
    a. Develop a set of written guidelines for the special project.
    b. Follow a set of written guidelines for the special project.

National Standard

*National Standard chosen will depend on the written plan selected.

DDT 292(1-6) Supervised Work Experience

Description: This course provides related on-the-job training in an office environment. This training must include at least 135 clock hours.

Hour Breakdown:

Semester Hours	Lecture	Externship	Contact Hours
1	0	3	45
2	0	6	90
3	0	9	135
4	0	12	180
5	0	15	225
6	0	18	270

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Apply technical skills needed to be a viable member of the workforce.
    a. Prepare a description of technical skills to be developed in the supervised work experience program.
    b. Develop technical skills needed to be a viable member of the workforce.

2. Apply skills developed in other program area courses.
    a. Perform skills developed in other program area courses in the supervised work experience program.

3. Apply human relationship skills.
    a. Use proactive human relationship skills in the supervised work experience program.

4. Apply and practice positive work habits and responsibilities.
    a. Perform assignments to develop positive work habits and responsibilities.

5. Work with the instructor and employer to develop written occupational objectives to be accomplished.
    a. Perform written occupational objectives in the supervised work experience program.

6. Assess accomplishment of objectives.
    a. Prepare daily written assessment of accomplishment of objectives.
    b. Present weekly written reports of activities performed and objectives accomplished to the instructor.

7. Utilize a set of written guidelines for the supervised work experience program.
    a. Develop and follow a set of written guidelines for the supervised work experience program.

GIT 1253 Cartography and Computer Map **Reading**

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.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Explain the principles and applications of global positioning systems (GPSs).
    a. Discuss the basic concepts and operations of a global positioning system.
    b. Demonstrate the use of the global positioning system to find latitude, longitude, and elevation.
    c. Demonstrate the use of the global positioning system to find state plane coordinates.
    d. Record location coordinates for a routing.
    e. Process data into X and Y coordinates (DMS, DD, DDM, etc.).

2. Describe and apply cartographic methodology.
    a. Describe and apply principles of cartography including construction of base maps and layering.
    b. Describe and apply principles of map design.
    c. Describe and apply methods of data conversion.

3. Differentiate between map datum and coordinate system.
    a. Describe and apply principles of map datum.
    b. Describe and apply principles of coordinate system.

4. Understand projection types and uses for Geographic Information Systems (GIS).

GIT 2113 Database Construction and Maintenance

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.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Define database management concepts and goals. ArcGIS Desktop Entry 19-001
    a. Describe how non-graphic attribute files will be structured.
    b. Perform manual data input.

2. Define project layout and presentation of data. ArcGIS Desktop Entry 19-001
    a. Describe how the project area will be subdivided and how GIS products will be presented.
    b. Convert existing data and manual input into project.
    c. Perform manual input and maintenance of the database.

3. Demonstrate knowledge of creating and/or completing real world projects. ArcGIS Desktop Entry 19-001
    a. Describe how the project area will be subdivided and how GIS products will be presented.
    b. Convert existing data and manual input into project.

National Standard

ArcGIS Desktop Entry 19-001

GIT 2123 Fundamentals of Geographical Information Systems (GISs) DDT 2123

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.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Identify the basic components of a geographical information system (GIS). ArcGIS Desktop Entry 19-001
    a. Identify and define a geographical information system.
    b. Describe how GIS is used to collect, analyze, and present data.

2. Explore careers in GIS.
    a. Describe GIS use in public and private agencies.
    b. Describe and compare the duties of a GIS manager, GIS database manager, cartographer, and GIS technician.

3. Perform basic operations and procedures using GIS software. ArcGIS Desktop Entry 19-001
    a. Define themes and layers, attributes, and other terms related to GIS.
    b. Define and compare vector data versus raster data.
    c. Create vector data using raster data.

4. Apply knowledge of joining external databases (dbf, excel, etc.) to GIS set. ArcGIS Desktop Entry 19-001
    a. Demonstrate knowledge of technical writing that includes instructions and specific details.

5. Introduce QGIS software and its components. ArcGIS Desktop Entry 19-001

National Standard

ArcGIS Desktop Entry 19-001

GIT 2133 Principles of Image Processing

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.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Explain how images are captured for use in GIS systems. ArcGIS Desktop Entry 19-001
    a. Describe how data can be captured in analog form.
    b. Perform data collection in digital form.
    c. Perform data transfer of an aerial photograph to GIS.

2. Digitize an aerial photograph (raster image) to a topographic map (vector image). ArcGIS Desktop Entry 19-001
    a. Utilize computer software to convert raster images to vector images.

3. Develop an Arc Map topographic map from a 3D Analyst. ArcGIS Desktop Entry 19-001
    a. Perform data collection from an aerial photograph.
    b. Prepare a topographic map using Arc Map software.

4. Demonstrate knowledge of image-related processes. ArcGIS Desktop Entry 19-001
    a. Describe and apply scale versus resolution in images.
    b. Apply an understanding of georeferencing (paper copy to digital image) in GIS.
    c. Understand image types for GIS (Sid, ecw, jpg, etc.).

National Standard

ArcGIS Desktop Entry 19-001

GIT 2263 Advanced Geographical Information Systems

Description: This is an integrated course that encompasses geographical data inputs, processing, analyses, and presentation.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Plan, conduct, and present a GIS-based project. ArcGIS Desktop Entry 19-001
    a. Prepare specifically designated project area database format for non-graphic attribute information.
    b. Prepare a designated project area base map.
    c. Perform linking of non-graphic map attribute data to graphic data in GIS.
    d. Perform manual input of non-graphic and graphic data.
    e. Prepare a report, and present findings.
    f. Prepare geodatabase projects.
    g. Demonstrate an understanding of basic programming.
    h. Demonstrate use of topology tool to eliminate gaps, overshoots and polygon.

National Standard

ArcGIS Desktop Entry 19-001

GIT 2273 Remote Sensing

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.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Explain principles of remote sensing data collection, interpretation, and applications. ArcGIS Desktop Entry 19-001
    a. Select a project area for evaluation.
    b. Find a resource for project area image data.
    c. Inspect and process image data of project areas for target information.
    d. Explore other resources and methods of remote sensing.
    e. Perform push broom and sweep operations.

2. Demonstrate image interpretation. ArcGIS Desktop Entry 19-001
    a. Perform aerial photograph interpretation using a stereoscope device.
    b. Perform aerial photograph interpretation using computerized methods.
    c. Perform satellite image interpretation using computerized methods.

National Standard

ArcGIS Desktop Entry 19-001

GIT 2423 Mapping and Topography for Geographical Information Systems

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.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Plan and draw a map. ArcGIS Desktop Entry 19-001
    a. Explain and draw a plan and profile.
    b. Define the various maps and symbols used in mapping.
    c. Prepare a contour map.
    d. Insert raster images into drawings.

2. Transform field notes into engineering drawings. ArcGIS Desktop Entry 19-001
    a. Explain an engineering drawing.
    b. Determine the correct scale size.
    c. Explain what information is needed from the field notes to complete a drawing. d. Complete a drawing from field notes.

National Standard

ArcGIS Desktop Entry 19-001

GIT 2453 GPS Surveying

DDT 2453

Description: This course teaches principles of surveying utilizing artificial earth orbit satellites. It also includes GNSS/RTK, and federal standards.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	1	4	75
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Demonstrate the ability to use GPS equipment.
    a. Define terminology.
    b. Transfer data between engineering software systems.

2. Define and utilize data generated by geographical information systems (GISs).
    a. Define how GPS is specifically designed for spatial analysis to fully analyze geographic data.
    b. Define GPS used in federal and state government, utilities, private engineering consulting firms, and corporations.

GIT 2513 Advance Database Creations

Description: This course will provide a continuation of database concepts and goals of database management systems, and relational, hierarchical, and network models of data. Advanced methods for organizing data are introduced and discussed.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Create a plan for placing attributes into a database. ArcGIS Desktop Entry 19-001
2. Understand knowledge of floating fields, text, integers, and other value types. ArcGIS Desktop Entry 19-001
3. Export data into Excel tables and other formats. ArcGIS Desktop Entry 19-001
4. Calculate distances between various data points on the table. ArcGIS Desktop Entry 19-001
5. Demonstrate familiarity with other relational databases. ArcGIS Desktop Entry 19-001
6. Demonstrate use of data queries. ArcGIS Desktop Entry 19-001
7. Understand and maintain database management. ArcGIS Desktop Entry 19-001

National Standard

ArcGIS Desktop Entry 19-001

GIT 291(1-3) Special Problem in GIS 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.

Hour Breakdown:

Semester Hours	Lecture	Lab	Contact Hours
1	0	2	30
2	0	4	60
3	0	6	90

Prerequisite: Instructor Approved

Student Learning Outcomes:

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.
    b. Perform written occupational objectives in the special problem.

2. Assess accomplishment of objectives.
    a. Prepare daily written assessments of accomplishment of objectives.
    b. Present weekly written reports of activities performed and objectives accomplished to the instructor.

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.

GIT 292(1-6) Supervised Work Experience in 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.

Hour Breakdown:

Semester Hours	Lecture	Externship	Contact Hours
1	0	3	45
2	0	6	90
3	0	9	135
4	0	12	180
5	0	15	225
6	0	18	270

Prerequisite: Instructor Approved

Student Learning Outcomes:

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.
    a. Prepare a description of skills to be developed in the supervised work experience program.
    b. Practice skills needed to be a viable member of the workforce.

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.
    a. Prepare daily written assessments of work performance as specified in the occupational objectives.
    b. Present weekly written reports to the instructor of activities performed and objectives accomplished.

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) **Work-Based Learning I, II, III, IV, V, and VI**

Description: A structured work-site learning experience in which the student, program area teacher, Work-Based Learning Coordinator, and worksite 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: 3-9 hours externship)

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: Instructor approved

Student Learning Outcomes:

1. Apply technical skills and related academic knowledge needed to be a viable member of the workforce

a. Apply technical skills needed to be a viable member of the workforce

b. Apply skills developed in other related courses in a work-based setting

c. Perform tasks detailed in an educational training agreement at the work setting

2. Apply general workplace skills to include positive work habits and responsibilities necessary for successful employment

a. Demonstrate pro-active human relationship skills in the work setting to include conflict resolution, team participation, leadership, negotiation, and customer/client service

b. Demonstrate time, materials, and resource management skills

c. Demonstrate critical thinking skills such as problem solving, decision making, and reasoning

d. Demonstrate acquiring, evaluating, organizing, maintaining, interpreting, and communicating information

e. Demonstrate positive work habits and acceptance of responsibilities necessary for successful employment

APPENDIX A: RECOMMENDED TOOLS AND EQUIPMENT

CAPITALIZED ITEMS

1. CAD stations with Internet access (20 per instructor)
    a. Current release AutoCAD and ArcGIS
    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. Inkjet printers/laser printers (5)
5. Drafting tables with chairs (21)
6. Total station with data collector, software, and accessories (1 per 3 students)
7. GPS and Robotic Total Stations with tripods (1 per 3 students)
8. Levels with tripods (1 per 3 students)
9. Large format color plotter/scanner/copier (2 per lab)
10. Dual Monitors (1 set per workstation)
11. 3D Printer (1 per lab)
12. 3D Scanner (2)
13. Digital Pen and Tablet

* Other equipment items can be added when deemed appropriate by the community college industry craft committee or by industry/business training requirements.

NON-CAPITALIZED ITEMS

1. Parallel bars (21)
2. Paper cutters (2)
3. CAD station desk with chairs (20)
4. Survey rods (1 per 3 students)
5. Range poles (1 per 3 students)
6. Chains, steel tapes S 100 ft or 200 ft (1 per 3 students)
7. Chaining pins, set of 11 with holder (1 set per 3 students)
8. Hammers (2 lb) (1 per 3 students)
9. Plumb bobs with holder and string (1 per 3 students)
10. Handheld two-way radios – rechargeable (1 set per 3 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 3 students)

* Other equipment items can be added when deemed appropriate by the community college industry craft committee or by industry/business training requirements.

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/DVD player (1)
8. Video/Audio data projector (1)
9. Laptop computer (1)
10. Digital camera/video camera (1)
11. Scanner (1)
12. Web-Based Software
13. Tablet
14. Apple TV
15. Document Camera

APPENDIX B: CURRICULUM DEFINITIONS AND TERMS

- Course Name – A common name that will be used by all community 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:
    - Career Certificate Required Course – A required course for all students completing a career certificate.
    - Technical Certificate Required Course – A required course for all students completing a technical certificate.
    - Technical Elective – Elective courses that are available for colleges to offer to students.

- Description – A short narrative that includes the major purpose(s) of the course

- 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

- Student Learning Outcomes – A listing of the student outcomes (major concepts and performances) 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 include integration of academic and career–technical skills and course work, school-to-work transition activities, and articulation of secondary and postsecondary career–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 college. 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 all of the required Career Certificate courses, Technical Certificate courses **AND** a minimum of 15 semester hours of General Education Core Courses. The courses in the General Education Core may be spaced out over the entire length of the program so that students complete some academic and Career Technical courses each semester. Each community college specifies the actual courses that are required to meet the General Education Core Requirements for the Associate of Applied Science Degree at their college.

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

- Adding new student learning outcomes to complement the existing competencies and suggested objectives in the program framework
- Revising or extending the student learning outcomes
- Adjusting the semester credit hours of a course to be up 1 hour or down 1 hour (after informing the Mississippi Community College Board [MCCB] of the change)

APPENDIX C: COURSE CROSSWALK

Course Crosswalk

Drafting and Design Technology
CIP: 15.0101 – Architectural Engineering Technology/Technician
CIP: 15.1102 - Land Surveying
CIP: 15.1301 – General Drafting
CIP: 45.0702 – Geographical Information Systems and Cartography

Note: Courses that have been added or changed in the 2021 curriculum are highlighted.

Existing			Revised		
2015 MS Curriculum Framework			2021 MS Curriculum Framework		
Course Number	**Course Title**	**Hours**	**Course Number**	**Course Title**	**Hours**
DDT 1133	Machine Drafting I	3		Course is not in the 2021 document.	
DDT 1143	Geometric Dimensioning and Tolerances	3	DDT 1143	Geometric Dimensioning and Tolerances	3
DDT 1153	Descriptive Geometry	3	DDT 1153	Descriptive Geometry	3
DDT 1163	Engineering Graphics	3	DDT 1163	Engineering Graphics	3
DDT 1173	Mechanical Design I	3	DDT 1173	Mechanical Design I	3
DDT 1183	Technical Math	3	DDT 1183	Technical Math	3
DDT 1213	Construction Standards and Materials	3	DDT 1213	Construction Standards and Materials	3
DDT 1313	Computer Aided Design I	3	DDT 1313	Computer Aided Design I	3
DDT 1323	Computer Aided Design II	3	DDT 1323	Computer Aided Design II	3
DDT 1413	Elementary Surveying	3	DDT 1413	Elementary Surveying	3
DDT 1513	Blueprint Reading I	3	DDT 1513	Blueprint Reading I	3
DDT 1523	Blueprint Reading II	3	DDT 1523	Blueprint Reading II	3
DDT 1613	Architectural Design 1	3	DDT 1613	Architectural Design 1	3
DDT 1713	Fundamentals of Machining Processes	3	DDT 1713	Fundamentals of Machining Processes	3
DDT 1813	Design for Manufacturing	3	DDT 1813	Design for Manufacturing	3
DDT 2153	Civil Planning and Design	3	DDT 2153	Civil Planning and Design	3
DDT 2163	Machine Drafting II	3	DDT 2163	Machine Drafting II	3
DDT 2183	Mechanical Design II	3	DDT 2183	Mechanical Design II	
DDT 2213	Structural Detailing I		DDT 2213	Structural Detailing I	3
DDT 2233	Structural Detailing II	3	DDT 2233	Structural Detailing II	3
DDT 2243	Cost Estimating	3	DDT 2243	Cost Estimating	3
DDT 2253	Statics and Strength of Materials	3	DDT 2253	Statics and Strength of Materials	3
DDT 2263	Quality Assurance	3	DDT 2263	Quality Assurance	3
DDT 2273	Facilities Planning	3	DDT 2273	Facilities Planning	3
DDT 2353	CAD Management	3	DDT 2353	CAD Management	3
DDT 2363	Computer Numerical Control (CNC) Drafting	3	DDT 2363	Computer Numerical Control (CNC) Drafting	3
DDT 2373	3D Modeling	3	DDT 2373	3D Modeling	3
DDT 2383	Fundamentals of CAD/CAM		DDT 2383	Fundamentals of CAD/CAM	3
DDT 2423	Mapping and Topography		DDT 2423	Mapping and Topography	3
DDT 2433	Legal Principles and Surveying I	3	DDT 2433	Legal Principles and Surveying I	3
DDT 2443	Boundary Surveying	3	DDT 2443	Boundary Surveying	3
DDT 2453	GPS Surveying	3	DDT 2453	GPS Surveying	3
DDT 2463	Legal Principles of Surveying II	3	DDT 2463	Legal Principles of Surveying II	3
DDT 2523	Pipe Drafting	3	DDT 2523	Pipe Drafting	3

DDT 2533	Highway and Road Design	3	DDT 2533	Highway and Road Design	3
DDT 2543	Steel Ship Building and Design	3	DDT 2543	Steel Ship Building and Design	3
DDT 2563	Introduction to Steel Ship Building and Blueprint Reading	3	DDT 2563	Introduction to Steel Ship Building and Blueprint Reading	3
DDT 2623	Architectural Design III	3	DDT 2623	Architectural Design III	3
DDT 2633	Pre-Engineering Metal Steel Building Drafting	3	DDT 2633	Pre-Engineering Metal Steel Building Drafting	3
DDT 2643	Naval Architecture and Ship Structures	3	DDT 2643	Naval Architecture and Ship Structures	3
DDT 2664	Marine Systems Integration	3	DDT 2664	Marine Systems Integration	3
DDT 2693	Route Surveying and Design	3	DDT 2693	Route Surveying and Design	3
DDT 2713	Fundamentals of Multimedia	3	DDT 2713	Fundamentals of Multimedia	3
			DDT 2723	Design Collaboration	3
			DDT 2753	Advanced 3D Modeling	3
DDT 2813	Inventor 3D Model and Animation	3	DDT 2813	Inventor 3D Model and Animation	3
DDT 2823	Revit Architecture	3	DDT 2823	Revit Architecture	3
DDT 291 (1-3)	Special Project	3	DDT 291 (1-3)	Special Project	3
DDT 292 (1-6)	Supervised Work Experience	3	DDT 292 (1-6)	Supervised Work Experience	3
GIT 1253	Cartography and Computer Map Reading	3	GIT 1253	Cartography and Computer Map Reading	3
GIT 2113	Database Construction and Maintenance	3	GIT 2113	Database Construction and Maintenance	3
GIT 2123	Fundamentals of Geographical Information Systems	3	GIT 2123	Fundamentals of Geographical Information Systems	3
GIT 2133	Principles of Image Processing	3	GIT 2133	Principles of Image Processing	3
GIT 2263	Advanced Geographical Information Systems	3	GIT 2263	Advanced Geographical Information Systems	3
GIT 2273	Remote Sensing	3	GIT 2273	Remote Sensing	3
GIT 2423	Mapping and Topography for Geographical Information Systems	3	GIT 2423	Mapping and Topography for Geographical Information Systems	3
GIT 2453	GPS Surveying	3	GIT 2453	GPS Surveying	3
GIT 2513	Advance Database Creations	3	GIT 2513	Advance Database Creations	3
GIT 291 (1-3)	Special Problem in GIS Technology	3	GIT 291 (1-3)	Special Problem in GIS Technology	3
GIT 292 (1-6)	Supervised Work Experience in Geographical Information Systems Technology	3	GIT 292 (1-6)	Supervised Work Experience in Geographical Information Systems Technology	3

APPENDIX D: RECOMMENDED TEXTBOOK LIST

Recommended Textbook List Drafting and Design Technology CIP: 15.0101 – Architectural Engineering Technology/Technician CIP: 15.1102 - Land Surveying CIP: 15.1301 – General Drafting CIP: 45.0702 – Geographical Information Systems and Cartography		
Book Title	**Author(s)**	**ISBN**
Technical Drawing with Engineering Graphics-15th ed	Giesecke, Lockhart, Goodman, and Johnson	978-0-13-430641-4
Up+Running with AutoCAD	Gindis	978-0-12-811058-4
Civil Drafting Technology-8th ed	Madsen	978-0-13-443604-3
Structural Steel Drafting & Design-2nd ed	Maclaughlin	978-1-4018-9032-2
Parametric Modeling with Autodesk Inventor	Shih	978-1-63057-101-6
Architecture: Residential Drafting and Design-12th ed	Kicklighter/ Thomas	978-1-63126-315-6
AutoCAD 2019 Instructor	Leach, Lockhart, and Tilleson	978-1-63057-184-9
Architectural Drafting and Design, 7th Ed.	Jefferis, Madden, and Madden	978-1-285-16573-8
Design Integration Using Autodesk Revit 2019	Stine	978-1-63057-179-5
Introduction to Solid Modeling Using SolidWorks 2019	Howard and Musto	978-1-260-11330-3
SolidWorks 2019 Basic Tools	Tran	978-1-63057-228-0