NAVAJO TECHNICAL UNIVERSITY

2016-2018 CATALOG

ADDENDUM

2017-2018 Academic Calendar

Fall Semester 2017

Pre-Registration Begins ....Apr 25
Faculty First Day ....Aug 7
New Student Orientation .... Aug 10
On-Site Registration ……………………. Aug 11
Instruction Begins ....Aug 14
Late Registration w/fee .... Aug 15-16
Last Day to Add/Drop Classes w/out W.....Aug 18
HOLIDAY - Labor Day ....Sep 04
Fall Graduation Petition due.......................Sep 29
Mid Term Exams.....................................Oct 2-6
Fall Break ....Oct 12-13
Last Day to Withdraw With a W ....Oct 20
HOLIDAY - Veterans Day observed ....Nov 10
HOLIDAY - Thanksgiving Day ....Nov 23
HOLIDAY - Navajo Family Day...............Nov 24
Final Exams ....Dec 4-7
Grades due to Registrar .... Dec 7
FALL GRADUATION..............……......… Dec 8
HOLIDAY - Christmas .... Dec 25

Spring Semester 2018

On-Site Pre-Registration .... Oct 30
HOLIDAY - New Year's Day....................... Jan 01
Faculty Return .... Jan 8
New Student Orientation.............................. Jan 11
On-Site Registration .... Jan 12
HOLIDAY - Martin Luther King Day ………. Jan 15
Instruction Begins.. Jan 16
Late Registration w/ fee ....Jan 17-18
Last Day Add/ Drop Classes w/out W ………. Jan 19
HOLIDAY - President's Day.........................Feb 19
Spring Graduation Petitions due ....Mar 2
Mid Term Exams .... .Mar 5-9
Spring Break... Mar 12-16
Last Day to Withdraw With a W ....Mar 29
Final Exams... May 7-10
Final Grades due .... May 10
SPRING GRADUATION………………….May 11

2018 Summer Session

Pre-Registration Begins .... Apr 2
Instruction Begins.......................................Jun 4
Late Registration w/ fee ....Jun 5
Last Day Add/ Drop Classes w/out W ……..Jun 6
Midterm Exam …………………………..Jun 22
Last Day to Withdraw ....Jun 27
HOLIDAY - Independence Day ....Jul 4
Last Day of Class/Grades Due...................Jul 13

See instructional site for orientation schedule

Effective: July 9, 2017

Corrections:

VA Educational Benefits

Navajo Technical University supports our Veterans who served by providing certificate and degree programs. Veterans considering applying for GI Bill benefits should go online: gibill.va.gov to access the Veterans On-Line Application (VONAPP) website to complete their VA form 22-1990. The NTU Financial Aid Officer will then certify those courses that are on the certificate or degree plan. Any questions regarding education benefits should be addressed to the call center at 1-800-983-0937. The Navajo Technical University Veteran's certifying official is located in the Financial Aid Office, 505-786-4183.

Course Load

The normal load for a full-time college student is 12-15 credit hours. An overload is 16 or more credit hours per semester. Part-time enrollment is up to 11 credit hours per semester. Students are allowed to register for a maximum of 21 credit hours per semester in the fall and spring. The normal load for a full time student during the summer session is 6 or more credits. *(Full Financial Aid requires 12 credit hours.)*

Credit Overload

An overload is 16 or more credit hours per semester. Students in good academic standing must obtain permission from the Dean of Instruction if they want to attempt a credit overload. An *Overload* form signed by the Dean of Instruction must be submitted prior to registering for the course.

- First semester students (not including transfer students) or students on academic probation or provisional admission will not be allowed to register for more than the allowed credit hours recommended by their Academic Advisor.
- A student should be in good standing (maintain a cumulative of 2.50 or better.) The Dean will require a copy of the student's transcript to verify academic standing and also the registration form of courses already registered for in order to verify credit hours.

TUITION AND FEES

The estimate cost of attending NTU is as follows

Cost	One Semester w/CIB[1]	One Semester Non-CIB[2]	Two Semesters w/CIB[1]	Two Semester Non-CIB[2]
Tuition[5] Full time (up to 15 Credit Hours)	$855	$1,710	$1,710	$3,420
Overload (16+ Credit Hrs) and Part-Time (up to 11 Credit Hrs)	$71.25/ Credit Hour	$142.50/ Credit Hour	$71.25/ Credit Hour	$142.50 Credit Hour
Activity Fee[3]	$50	$50	$100	$100
Technology Fee [4]	$50	$50	$100	$100
Library Fee [4]	$50	$50	$100	$100
Athletic Fee[3]	$50	$50	$100	$100
Total	$1,055	$1,910	$2,110	$3,820

Out-of-state tuition does not apply since tuition at NTU is based on whether or not a student is an enrolled member of a federally recognized Indian tribe or not.

Part-Time Student – up to 11 credit hours
Full-Time Student – 12-15 credit hours
Overload Student – over 15 credit hours

[1] Enrolled members with a census number or enrollment number (CIB) of a federally recognized tribe.

[2] Non-enrolled members (no census number) or no enrollment
number.

[3]Applies to Full-Time students and Overload Students
[4] Applies to Part-Time Students

[5] Tuition is calculated at $71.25 per credit hour for enrolled tribal members up to fifteen (15) credit hours for full-time status. Additional credit hours over fifteen (15) hours will be charged per credit hour. Summer session full-time credit hour is calculated according to the number of weeks plus one. Therefore tuition is based on number of credit hours up to full-time status.

On-Line Course Fee: $35.00 fee for each on-line course to cover support service (i.e., tutoring and on-line learning tools).

CERTIFICATE PROGRAM

NAVAJO COURT TRANSCRIPTION/INTERPRETATION PROGRAM

The program is comprised of classes in legal (tribal court) interpretation. The interpretation program involves a class in the introduction to the field of interpretation, a class in consecutive, simultaneous and sight interpretation, and a class in legal interpretation (tribal court system). Each student's progress and potential for successful completion of the program will be evaluated. Students must complete this course with a grade of B or higher, and must receive a score of at least a B on the exit examination in order to receive a certificate. This course will address the development and an awareness of the principles and the current issues involved in interpretation and translation.

Navajo Court Transcription/Interpretation Requirements: 32 Credits

GENERAL EDUCATION REQUIREMENTS		Credits
NAV 110	Foundation of Navajo Culture	3
NAV 201	Introduction to Navajo Language	4
MTH 113	Technical Mathematics II	3
ENG 105	Technical Writing	3
CMP 101	Introduction to Computers	3
NAVAJO COURT TRANSCRIPTION/INTERPRETATION CORE COURSES		
		Credits
LAW 106	American Indian Law	3
CRT 101	Introduction to Court Transcription	3
NAV 203	Interpretation/Translation (English/Navajo)	4
CRT 111	Transcription Lab (Court Case Studies)	3
CRT 112	Transcription Lab II (Court Case Studies)	3
TOTAL REQUIRED CREDIT HOURS		**32**

LAW ENFORCEMENT

(Offered only at the Chinle Campus)

The certificate of Law Enforcement is a joint effort between NTU and the Navajo Nation Public Safety Department to produce Navajo Nation Police Officers. The 22-week certificate program provides both the academic and skills components that are required for Navajo Nation Law enforcement.

The candidate must: 1. Satisfy the certificate requirements in the program prior to the date of graduation at which the certificate is to be awarded. 2. Have a minimum of 12 semester credits in residence that apply toward the certificate being pursued and meet the requirements for the applicable program.

Law Enforcement: 33 Credits

GENERAL EDUCATION REQUIREMENTS		Credits
NAV 221	Navajo Government	3
MTH 113	Technical Mathematics II or higher	3
ENG 105	Technical Writing	3
CMP 101	Introduction to Computers or higher	3
LAW ENFORCEMENT CORE COURSES		
Requirements		**Credits**
PS 101	Intro to Criminal Justice	3
PS 103	Public Safety Report Writing	3
PS 109	Substantive Criminal Law	3
PS 123	Law Enforcement Ethics: Ethics & Criminal Justice (Community & Police Relations)	3
PS 170	Forensic Science (Patrol Procedures)	3
PS 230	The Police Function I (Traffic)	3
PS 235	The Police Function II (Police Proficiency Skills)	3
PS 260	Procedural Criminal Law (Criminal Investigations)	3
TOTAL REQUIRED CREDIT HOURS		**33**

Welding Technology

The Welding Technology Program prepares students for work in the field Welding Technology. In addition to gaining an overall understanding of welding machines, weld processes, and hands-on welding proficiency, students develop skills in the areas of blueprint reading, welding symbols, weld inspection, destructive and non-destructive testing, metallurgy, computer-aided drafting along with precisions machine tool operations. Students gain knowledge and skills necessary to prepare them for weld qualification to code specifications.

The Certificate in Welding Technology stresses the practical applications of welding on plate pipe in all positions and the necessary theory to support those skill levels. Welding skills are developed with supported courses. A student must earn a grade of C or higher in all courses required for the program in order to receive a certificate.

Requirements 33 Credits

GENERAL EDUCATION REQUIREMENTS		**Credits**
ENG 105	Applied Technical Writing	3
MTH 113	Technical Mathematics II	3
NAVXXX	Navajo Studies Course	3
CMP101	Introduction to Computers	3
WELDING CORE COURSES		
Semester ONE		**Credits**
WLD101	Welding Fundamentals I	3
WLD105	Pipe Welding I	3
WLD115	Structural Welding I	3
Semester TWO		
ENGR143	Characteristics of Engineering Materials	3
WLD125	Structural Welding II	3
WLD130	Welding Fundamentals II	3
WLD150	Pipe Welding II	3
TOTAL REQUIRED CREDIT HOURS		**33**

ASSOCIATE OF APPLIED SCIENCE

ACCOUNTING

The Accounting program offers an Associate of Applied Science in Accounting degree and a Certificate in Bookkeeping. As an Accounting Technician, a student will be able to pursue further education in Accounting or seek employment.

A.A.S. Degree in Accounting Requirements: 62 credits

ACCOUNTING DEGREE		
GENERAL EDUCATION REQUIREMENTS		**Credits**
English/Communication:		6
	ENG 110	
	COM130 or COM 150	
Mathematics:		4
	MTH 121 or higher	
Dine Studies:		3-4
Natural or Physical Science:		4
Humanities/ Social Science:		3
Information Tech/Applied Computers:		3
	CMP 101 or higher	
ACCOUNTING CORE REQUIREMENTS		
Semester ONE		**Credits**
ECN 111	Introduction to Economics	3
ACG 201	Payroll Accounting	3
ACG 204	Advanced Accounting I	3
ACG 210	Principles of Management	3
Semester TWO		
ACG 211	Accounting Software Applications	3
ACG 212	Introduction to Finance	3
ACG 213	Introduction to Fund Accounting	3
Semester THREE		
ACG 214	Advanced Accounting II	3
ACG 215	Income Tax II	3
ACG 216	Principles of Marketing	3
Semester FOUR		
LAW203	Business Law	3
ACG 220	Cost Accounting	3
ACG 225	Managerial Accounting	3
TOTAL REQUIRED CREDIT HOURS		**62**

BUILDING INFORMATION MODELING

60 Credits

The Building Information Modeling (BIM) program prepares students to pursue a drafting career. Students in the CAD program work with 2-D CAD, Microsoft Office Suite, and commercial and residential blueprint reading. Student completing the BIM degree program will have a broad range of 2-D and 3-D CAD, drafting skills and a solid, well-rounded educational foundation. Skills obtained at NTU give students the opportunity to apply in various internships with NASA, NASA affiliates and gain employment in various industries such as architectural or engineering firms. Students completing the BIM program will be given the opportunity to take the Autodesk Certified User exam to show competency in AutoCAD, Inventor (mechanical 3- D software) and Revit (architectural 3-D software). Students completing the CAD program only have the opportunity to take the Autodesk Certified User exam show competency in AutoCAD. NTU has articulation agreement to assist students to transfer to the Bachelor of Environmental Planning and Design (BAEPD) degree program at the University of New Mexico (UNM). The Community and Regional Planning Department will recognize students who complete this course of study as having met the same requirements for the degree as UNM students who have completed UNM courses. Students should contact the Undergraduate Advisor at the School of Architecture and Planning for current curriculum requirements.

Building Information Modeling Requirements:

BUILDING INFORMATION MODELING DEGREE		
GENERAL EDUCATION REQUIREMENTS		**Credits**
English/Communication:		**9**
	ENG 110	
	COM130 or COM 150	
	ENG 111	
Mathematics:		**4**
	MTH 121 or higher	
Dine Studies: NAV 101		**4**
Natural or Physical Science:		**4**
Humanities/ Social Science:		**12**
	NAV110	3
	PSY105	3
	ENG150	3
	HST210 or HST211	3
Information Tech/Applied Computers:		**3**
	CMP 101 or higher	
BIM CORE COURSES		
Semester ONE		**Credits**
DFT 120	Computer-Aided Drafting I	3
GIT 110	Geographic Information System I	3
Semester TWO		
PHY 101	Introduction to Physics w/Lab	4
DFT 220	Computer Aided Drafting II	3
AMT 311	Laser Scanning Methods and Techniques	3
Semester THREE		
DFT 112	Architectural Drafting	3
DFT 240	Building Codes	3
MTH 213	Elementary Statistics	3
Semester FOUR		
DFT 212	Advanced Architectural Drafting	3
DFT 250	Construction Management/Estimation	3
TOTAL REQUIRED CREDIT HOURS		**67**

CONSTRUCTION TECHNOLOGY

Construction Technology offers specialized instruction in modern techniques of the construction practice. The goal of the program is to produce highly competent and technically trained graduates who possess a solid understanding of construction concepts. The program prepares graduates to work with architects, engineers, contractors, and other concerned with construction. All graduates are encouraged to become Occupational Health and Safety Administration (OSHA) and National Center for Construction Educational Research (NCCER) certified.

The Associate of Applied Science Degree in Construction Technology also focuses on three fundamental principles: Creative Problem Solving/Spirit of Innovation, Collaboration and a Rich Learning Experience

A.A.S. – Construction Technology Requirements: 63 Credits

GENERAL EDUCATION REQUIREMENTS		**Credits**
English/Communication:		**6**
	ENG 105	
	ENG 112	
Mathematics:		**4**
	MTH 121 or higher	
Dine Studies: NAV110		**3-4**
Natural or Physical Science:		**4**
	ENV102	
Humanities/ Social Science:		**3**
	COM 150	
Information Tech/Applied Computers:		**3**
	CMP 101 or higher	
CONSTRUCTION TECH CORE REQUIREMENTS		
Semester ONE		**Credits**
CT 100	Residential Construction and Carpentry	3
CT 101	Construction Graphics & Blue Print Reading	3
CT 102	Technical Drafting	3
CT 103	Introductory Craft Skills	3
Semester TWO		
CT 104	Concrete and Masonry Construction	3
CT 105	HVAC (Heating, Ventilation and Air Conditioning	3
CT 106	Materials and Methods of Constructions	3
CT 107	Construction Site Safety Management	3
Semester THREE		
CT 200	Construction Codes and Specifications	3
CT 201	Constructions Cost Estimating	3
CT 202	Construction Planning and Control	3
CT 203	Basic Surveying and Measurement	3
Semester FOUR		
CT 204	Construction Technology Internship/OJT	4
TOTAL REQUIRED CREDIT HOURS		**63**

CONSTRUCTION TECHNOLOGY DEGREE

CHEMICAL ENGINEERING TECHNOLOGY

Chemical Engineering and Process Technologists and Technicians work on industrial processes designed to convert raw materials into petroleum products. Since the Four Corners region has significant oil and gas fields, there are a number of refineries and other oil and gas related operations throughout the area. Technologists run production units, help design operations, implement process controls and address corrosion concerns. They do these tasks both in the field and in large plants. They also research products and technologies as well as environmental and reclamation techniques. Environmental reclamation, given the number of abandoned mine sites on the Navajo Nation and in Arizona, Utah, and Colorado, provides jobs throughout Navajo Tech's service area.

A.A.S. – Degree Requirements: 62 Credits

CHEMICAL ENGINEERING TECHNOLOGY DEGREE		
Semester ONE		**Credits**
MTH 121	College Algebra	4
ENG 110	Freshman Composition	3
CHM120	General Chemistry I	4
CHEM 117	Introduction to Chemical Laboratory Equipment	4
CHEM 119	Safety, Health & Environment I	4
Semester TWO		
CMP 101	Introduction to Computers	3
NAV 225	Dine Philosophy of Education	3
CHEME115	Introduction to Process Technology	3
CHEM218	Process Technology II System	4
Semester THREE		
COM 130	Public Speaking	3
HUMXXX	Humanities/Social Science Course	3
CHEME202	Industrial Chemistry and Lab	4
CHEME231	Process Technology III Operation	4
CHEME222	Fundamentals of Chemical Engineering	4
Semester FOUR		
CHEME223	Petroleum Refinery Engineering & Petrochemicals	4
CHEME224	Quality Control in Chemical Engineering	4
CHEME230	Practicum in Industry	4
TOTAL REQUIRED CREDIT HOURS		62

VETERINARY TECHNICIAN

The mission of the Veterinary Technology degree program is to provide students with the academic, professional "hands-on" knowledge, and skills required to master the American Veterinary Medical Association's Veterinary Technology Student Essential Skills which will prepare students as entry-level veterinary technicians, to successfully pass the VTNE (Veterinary Technician National Exam), and to perform as effective veterinary health care team members. Students will exhibit conduct that reflects practice standards that are professional, ethical, and legal. Graduates of this program will recognize career opportunities in traditional and non-traditional settings such as private veterinary practice, biomedical research, academia, food safety, government agencies, zoos, and other animal health-related fields.

The length of time necessary for completion of the program is a minimum of 7 semesters. A minimum of 69 credit hours must be earned in specific coursework including general education and core program courses. Students must meet with the Program Advisor before registering for classes each semester. Students must pass the VTNE in order to apply for state licensure.

- Students must complete all general education courses prior to admission into program core courses. Students must maintain at least an overall G.P.A. of 2.5 for all required General Education courses and must earn grades of "C" or higher in BIO 120, CHM 120, ENG 110 (or ENG 111 or 112), MTH 121 and VET 090.

- Students must pass VET 090 Introduction to Veterinary Technology course (1 cr hr) with a grade of "C" or higher which shall be completed while taking General Education courses.

- Students must complete all program courses with a grade of 75% or higher in order to progress into the following semester's courses. Students will be placed on probation only once if they score below 75% in one of their courses. The second time they score below 75% in another course, they will not proceed in the program with the cohort they started with and must repeat the course until they are available again. Final approval of the probation and to allow the students to continue into the following semester rests solely on the Veterinary Technology faculty.

Other requirements for admission into the Veterinary Technology Program can be found under Admission:

Veterinary Technician Requirement: 69 Credits

VETERINARY TECHNICIAN DEGREE		
REQUIREMENTS BEFORE ADMISSION		**Credits**
English/Communication:		**3**
	ENG 110 or ENG 111 or ENG 112	
Mathematics:		**4**
	MTH 121 or higher	
Dine Studies:		**3**
	NAV 101 or 102 or 201 or 202	
Natural or Physical Science:		**8**
	BIO120, CHM120	
Introduction to Veterinary Technology: VET090		**1**
VETERINARY TECH REQUIREMENTS		
Semester ONE		**Credits**
VET130	Veterinary Medical Terminology	1
VET131	Navajo Veterinary Medical Terminology	1
VET132	Veterinary Office Procedure	1
VET134	Veterinary Anatomy and Physiology I	6
VET136	Veterinary Nursing I	2
Semester TWO		
VET140	Veterinary Surgical Nursing	2
VET142	Veterinary Pharmacology for Technicians	2
VET144	Veterinary Clinical Laboratory Procedures I	3
VET146	Veterinary Nursing II	2
VET148	Animal Nutrition	2
VET150	Veterinary Dentistry	1
Semester THREE		
VET230	Veterinary Medicine and Surgery	3
VET232	Veterinary Anesthesiology	3
VET234	Veterinary Clinical Laboratory Procedures II	4
VET236	Veterinary Diagnostic Imaging I	2
Semester FOUR		
VET240	Veterinary Diagnostic Imaging II	2
VET242	Avian, Exotic, Lab Animal Husbandry & Handling	2
VET244	Veterinary Clinical Laboratory Procedures III	3
VET246	Veterinary Nursing II	2
VET248	Veterinary Critical Care	2
VET250	Veterinary Technician National Exam Review	1
Semester FIVE (Summer)		
VET260	Veterinary Technology Practicum I (12wks)	3
TOTAL REQUIRED CREDIT HOURS		**69**

BACHELOR OF SCIENCE

BIOLOGY

The Biology Degree program is rich in biology and chemistry, and other related areas of study that includes biochemistry, genetics and cell biology. The program provides a solid background in physics and mathematics.

Students develop a broad knowledge of biology that is integrated with dynamic high quality research programs in specialized areas like molecular biology, genetics, animal and plant physiology, ecology, cell and developmental biology, evolution and behavior. Research experience would instill students the scientific application of theoretical knowledge to real world problems, as well as the opportunity to work with and get to know researchers working in their desired fields. Knowledge of these specialized subjects is intended to lay the groundwork for entry into a range of much needed professions in the Native American Communities such as the Navajo Nation, including medicine, dentistry, optometry, pharmacy, conservation and management of the environment, and broader job opportunities elsewhere in biotechnology, agriculture, forestry, and fisheries.

A student needs to complete the core Biology and general education courses within the first two years of study with a grade point average of 2.5 or better before taking the upper level core courses (300 and 400-level courses).

BIOLOGY PROGRAM		
Semester ONE		**CREDITS**
COM 130	Public Speaking	3
ECN 111	Introduction to Economics	3
ENG 110	Freshman Composition	3
PSY 105	Introduction to Psychology	3
MTH 121	College Algebra	4
Semester TWO		
ENG 111	Composition and Research	3
MTH 123	Trigonometry	4
HUM 170	History of Native American in Media	3
NAV 110	Foundations of Navajo Culture	3
BIO 120	Principles of Biology I	4
Semester THREE		
HST 220	History of the American Southwest	3
NAV 225	Dine Philosophy of Education	3
PSY 210	Developmental Psychology	3
CHM 120	General Chemistry	4
PHY 101	Introduction to Physics	4
Semester FOUR		
MTH 315	Biostatistics	4
BIO 122	Principles of Biology II	4
CHM 122	General Chemistry II	4
PHY 111	Algebra-based Physics	4
Semester FIVE		
BIO 222	General Botany with Lab	4
CHM 468	Organic Chemistry with Lab	4
BIO 224	Microbiology	4
BIO 226	Principles of Genetics	4
Semester SIX		
CHM 286	Inorganic Chemistry with Lab	4
BIO 130	Human Anatomy and Physiology I	4
BIO 302	Cell Biology	4
BIO 409	Molecular Biology	4
Semester SEVEN		
CHM 470	Organic Chemistry II with Lab	4
CHM 472	Introduction to Biochemistry	4
BIO 131	Human Anatomy and Physiology II	4
BIO 410	Ecology	4
Semester EIGHT		
BIO 404	Bioinformatics	4
BIO 408	Nutrition and Obesity	4
BIO 411	Ethnobotany	4
BIO ELEC - choose one	BIO 225 Medical Writing	4-5 credits
	BIO 400 Model Organisms	
	BIO 402 Biology Research Projects	
	BIO 405 Cancer Biology and Therapeutics	
	BIO 406 Diabetes and Complications	
	BIO 407 Diagnostic Enzymology	
	BIO 412 Development Biology	
	BIO 413 Evolutionary Biology	
TOTAL CREDIT HOURS REQUIRED		**130**

ELECTRICAL ENGINEERING

A Bachelor's degree in electrical engineering requires **120** credit hours and the electrical engineering degree is designed for a four-year program of study.

A student needs to complete general courses and general education electives within the first two years of study with a grade point average of 2.0 or better before taking the upper level core courses (300 and 400-level courses). However, to complete the program within four years, a credit load of 15 to 18 is recommended.

The electrical engineering program is designed to prepare students to design and improve electrical, electronic and computer systems. The program combines practical exposure to the most modern technologies available with a theoretical foundation that empowers students to master future changes and innovations.

Students can select them following area of concentration:

- Computer Engineering/Digital Systems
- Electric Power and Energy Systems
- Manufacturing

B.S. - ELECTRICAL ENGINEERING		
Semester ONE		
EE 101	Electrical Engineering Fundamentals I	3
ENGR 103	Introduction to Engineering	3
CS ELEC	Computer Programming Elective	3
ENG 110	Freshman Composition	3
NAV 101	Introduction to Navajo Language	4
Semester TWO		
EE 102	Electrical Engineering Fundamentals II	3
EE 103	Digital Logic Design	3
CHM120	General Chemistry I	4
ENG 111	Composition and Research	3
HUMXX	Humanities Elective	3
Semester THREE		
EE 201	Electrical Engineering Fundamentals III	3
MTH 205	Discrete Mathematics	3
MTH162	Calculus I	4
XXX	Concentration Course	3
SSCXX	Social Science or Behavioral Science Elective	3
Semester FOUR		
EE 202	Electrical Engineering Fundamentals IV	3
EE 203	Electronics I	3
EE 212	Instrumentation	2
MTH 163	Calculus II	4
PHY111/121	Algebra or Calculus Based Physics I	4
Semester FIVE		
EE 301	Signals & Systems	3
ENGR301	Introduction to Modeling & Simulation	4
MTH 310	Differential Equations	4
PHY112/122	Algebra or Calculus Based Physics II	4
XXX	Concentration Course	3
Semester SIX		
EE 303	Probability & Random Signals	3
EE 310	Embedded System Design	3
EE 312	Instrumentation II	2
EE 396	Junior Research Project	3
Summer Session		
EE 313	Summer Internship	3
Semester SEVEN		
EE422	Capstone Design I	3
EE 406	Computer Networks	3
XXX	Concentration Course	3
XXX	Concentration Course	3
Semester EIGHT		
EE 423	Capstone Design II	3
MTH410	Linear Algebra	3
XXX	Concentration Course	3
XXX	Concentration Course	3
TOTAL REQUIRED CREDIT HOURS:		**120**

***capstone design course must be related to the chosen concentration.*

Listing of Concentrations: *choose one concentration*

Computer Engineering/Digital Systems Concentration		
ITS 250	Data Structures	3
EE 230	Introduction to VHDL and FPGA	3
EE 330	Computer Organization & Assembly Language Programming	3
EE 430	Computer Architecture and Design	3
EE 440	Operating Systems I	3
XXX	Technical Elective (Computer Engineering)	3
Electrical Power and Energy Systems Concentration		
EE 370	Electrical Machinery	3
EE 460	Electrical Power Plants	3
EE 470	Electric Power Devices	3
EE 471	Power System Analysis	3
EE 472	Power Electronics & Power Management	3
XXX	Technical Elective (Electrical Power)	3
Manufacturing Concentration		
ENGR234	Engineering Statistics	3
IE 235	Lean Production	3
ENGR313	Engineering Economics	3
IE 363	Design of Experiment	3
IE 413	Quality Control	3
IE 483	Rapid Prototyping	3

Listing of Technical Electives:

EE 223 Semiconductors I EE 230 Introduction to VHDL/ FPGA
EE 330 Computer Organization & Assembly Language Programming
EE 343 Introduction to VLSI Design3 EE 370 Electrical Machinery
EE 313 Summer Internship* EE 403 Digital VLSI
EE 407 Communication Systems EE 413 Analog VLSI
EE 430 Computer Architecture & Design EE 460 Electrical Power Plants
EE 470 Electric Power Devices EE 471 Power System Analysis
EE 472 Power Electronics & Power Mgmt EE 440 Operating Systems I
IT 315 Multicore Programming MTH 410 Linear Algebra
MTH433 Numerical Analysis w Computers EE-x95 Topics in EE
EE 196 Freshman Research Project EE 296 Sophomore Research

**Summer internship should be taken in a field that supports the chosen concentration.*

Course Descriptions:

Construction Technology

CT 101(3) Construction Graphics and Blueprint Reading
This course introduces students to drawing skills and techniques necessary to produce basic construction drawings. Emphasis is placed on the interpretation of the requirements of contract drawings, understanding terminology, symbols, and conventions used in residential, commercial, and industrial drawings, including architectural, structural, mechanical, electrical plans and sections.

CT 102 (3) Technical Drafting
This course advances the design communication strategies introduced in Introduction to Construction Technology by further developing skills in digital visualization and communication techniques. Additionally, students will expand their skill set to include advanced applications to include landform and three-dimensional space and object modeling and be introduced to digital fabrication and three-dimensional output.

CT 103 (3) Introductory Craft Skills
Development of skills and techniques necessary for basic construction/industrial maintenance craft skills.

CT 104 (3) Concrete and Masonry Construction
A study of the versatility, durability, and mix design of quality concrete. Also included is the study of the use of masonry in modern construction. Both classroom and laboratory experiences will assist students in developing a firm understanding of use concrete and masonry materials.

CT 105 (3) HVAC (Heating, Ventilation and Air Conditioning)
This course is intended to prepare Construction technology students with the ability to understand and recognize different types, components and accessories of HVAC systems.

CT 106 (3) Materials and Methods of Construction
This course provides an introductory overview of the various materials used in construction. The students will learn about material and product manufacturing techniques and how they relate to mechanical and non-mechanical properties of the various materials. Common construction methods are introduced and building details are explored. Students have the opportunity to experience material capacity and behavior as well as construction methods in demonstrations and lab experiments. Furthermore, material applications and detailing in structural and non-structural building components are explored. Resulting from this course, students will gain a comparative knowledge of material properties and possible applications in construction and architecture.

CT 107 (3) Construction Site Safety Management
Emphasis is placed on identifying and reducing safety risk on the job site. Students will study OSHA standards, accident and fire prevention, protection from hazardous materials, use of protective equipment and clothing, construction equipment and other safety concerns. The role of managers, workers, sub-contractors and others is stressed. Student will gain an appreciation for how accidents and safety concerns affect morale and productivity.

CT 200 (3) Construction Codes and Specification
A study of the interpretation of technical building specifications, codes, and contract documents as they affect the selection, and application of materials and equipment. The course will emphasize understanding of local and state codes.

CT 201 (3) Construction Cost Estimating
Students will study fundamentals of performing construction estimates including making material quantity take-offs and labor estimates. The Construction Specifications Institute (material divisions) will be used to organize the estimating process. Emphasis is placed on interpreting plans and specifications to determine accurate material quantities and labor estimates, selection of appropriate material grades and types, and other miscellaneous cost associated with successful completion of a building project.

CT 202 (3) Construction Planning and Control
Covers the concepts and techniques for scheduling and control systems for effectively managing a construction project. Students will obtain the skills and knowledge necessary to effectively plan and schedule a project, to monitor and control all project aspects, and to anticipate and resolve problems as they occur.

CT 203 (3) Basic Surveying and Measurement
Presents fundamentals of surveying, including use of transit, reading angles, land description, restrictions and legal problems. Covers topographical maps and their use.

CT 204(4) Construction Technology Internship/ OJT
Major focus is to provide practical on-the-job experience working with a construction company. Student interns might work in the areas of print reading, estimating, equipment management, project supervision, or other management related activities and tasks.

Biology

BIO-225 (3) Medical Writing
This course is design to provide students with the means for communicating their scientific knowledge according to biomedical conventions. Topics covered include, the scientific method, developing a literature search strategy, reading and writing scientific papers, instructions for preparing a laboratory report or scientific paper, examples of good laboratory reports, poster presentations, oral presentations, word processing in Microsoft word, making graphs in Microsoft excel, preparing oral presentations with Microsoft PowerPoint.
Prerequisite: ENG 110 and ENG 111.

BIO-226 (4) Principles of Genetics
This course is to enable students understand the fundamental terms and principles of genetics and its importance to society at large, especially the hereditary nature of traits that are fundamental to who and what we are. The fundamental concepts in genetics will be reviewed (cell types, units of heredity, alleles, phenotypes, DNA, RNA, gene locations in chromosomes, mitosis and meiosis, mutations). Topics to be covered include, chromosome and cellular reproduction, heredity, sex determination and sex-linked characteristics, pedigree analysis and genetic testing, linkage, recombination, and gene mapping, bacterial and viral genes, chromosomal variation, DNA and the chemical nature of the gene, RNA, the genetic code, regulation of gene expression, gene mutations and repair, molecular genetics and biotechnology, genomics and proteomics, organelle DNA, developmental genetics and immunogenetics, and also cancer, quantitative, evolutionary and population genetics. *Lab included. Prerequisite: BIO-120 or BIO-122 or permission of the instructor.*

BIO-302 (4) Cell Biology
The purpose of the course is to enable students understand the cell as a microcosm that demonstrates all the themes that connect the concepts of biology. Topics to be covered include Microscopy and cell investigation, prokaryotic and eukaryotic cell anatomy and physiology, endomembrane systems and their functions, cytoskeletons and function, extracellular matrix, membrane structure and function, passive and active membrane transport, cellular metabolism, cellular respiration, photosynthesis, cell communication, cell cycle and cell culture . Loss of cell cycle control and cancer will be emphasized. *Lab included. Prerequisite: BIO-120 or BIO-122 or permission of the instructor.*

BIO-400 (4) Model Organisms
This course provides information on the simplest and most accessible systems in which the fundamental problems in biology are easily solved. The most important model organisms to study include, *Escherichia coli* and its phage, the T-phage and phage λ; baker's yeast *Saccharomyces cerevisiae*; the mustard-like weed, *Arabidopsis thaliana*; the nematode *Caenorbabditis elegans*; the fruit fly *Drosophila melanogaster*; and the house mouse *Mus musculus*. The course will consider the principal features and advantages of each model system and the kind of experimental tools that are available for studying each organism, and some of the biological problems that have been studied in each case. *Lab included. Prerequisite: BIO 224, BIO 302, or permission of the instructor.*

BIO-402 (5) Biology Research Project
The biology research project is to provide students with the essential hands-on learning opportunities required for through understanding of biology experimentation. The projects to be approved by instructors must offer features that encourage students to think about how concepts apply to the problems at hand. By working on these projects, students are expected to appreciate the scientific method in general, and laboratory policies and procedures in particular. Students would be required to prepare oral presentations to appropriate classes as assigned by instructor. *Prerequisites: BIO 120,122, 224,226,302*.

BIO-404 (4) Bioinformatics
The course is designed to allow contemporary biologists familiarize themselves with several bioinformatics programs and databases that would enable them deal with numerous challenges posed by the genomic era. The course explains the basics of bioinformatics followed by discussion of current computational tools for solving biological research problems. Major themes in bioinformatics are covered, including biological databases, sequence alignment, gene and promoter prediction, molecular phylogenetics, structural bioinformatics, genomics, and proteomics. *Prerequisites: BIO 120, 122, 226, 302, and CHM 471 or permission of the instructor.*

BIO-405 (3) Cancer Biology and Therapeutics
This course is designed to acquaint students with the prevailing theory which underpins the genesis and treatment of cancer. Topics covered include broad insight into cancer, etiology of cancer, identification and histopathology of cancer, cancer cell immortality, oncogenes, tumor suppressor genes, apoptosis, angiogenesis, metastasis, and therapeutics. *Prerequisites: BIO 120, 122, 226, 302, and CHM 471 or permission of the instructor.*

BIO-406 (3) Diabetes and Complications
American Indians have higher morbidity and mortality rate from diabetes compared to other Americans. This disease is preventable to some degree, thus provoking culturally congruent intervention programs. The benefit to the community is enormous when interest is stirred on the outcomes of the disease. The historical and social context of diabetes will be discussed by focusing on its classification, diagnosis, epidemiology, and global burden. The normal and pathophysiology of diabetes will be explained followed by pathogenesis of types I and II diabetes, obesity, insulin resistance and metabolic disturbances. Various causes of diabetes and complications will also be discussed. *Prerequisites: BIO 120, 122, and CHM 471 or permission of the instructor.*

BIO-407 (3) Diagnostic Enzymology
This course is aimed at contributing to students' knowledge of the role of diagnostic enzymology in diagnosis of diseases at certain stages outside histological recognition. The course will begin with an introduction to enzymology and kinetics of enzymatic reactions, fundamental aspects of measurement of enzyme activities, basis of diagnostic enzymology, spectroscopic and non-spectroscopic measurements of reaction products, problems associated with sample used for assays, and the main types of samples for enzyme analysis, including urine, blood, and milk. Practical aspects involving measurement of enzyme reaction rates, special problems regarding the reliability of enzyme assays, and specific examples of the value of diagnostic enzymology using enzymes from the typical samples will be discussed. *Prerequisites: BIO 120, 122, and CHM 471 or permission of the instructor.*

BIO-408 (3) Nutrition and Obesity
The aim of this course is to enhance the application of the knowledge of nutrition in selecting, combining, preparing, storing, serving, and modifying food to nurture the health of an individual. The course also examines the role of over-nutrition in obesity and disease. Topics would include the science of food, nutrition and health, major nutrients and vitamins, macro and micro-elements, water and electrolyte balance, interrelationship of nutrients, recommended daily allowances, cereals, pulses, nuts and oils, vegetables, fruits, milk and milk products, meat and fish, eggs, beverages, spices, and condiments, nutritive value of Indian/Navajo foods, food adulteration, exchange list, food poisoning and food borne infection, toxicants in food, food allergy, nutrition of normal infants, pre-school children, children , adolescents , old age and pregnant women. Nutrition, obesity and disease would also be discussed.

BIO-409 (4) Molecular Biology
This course provides an introduction to the fundamental concepts of molecular biology and its applications. It will cover a broad range of topics to show that molecular biology is applicable to human medicine and health, as well as veterinary medicine, evolution, agriculture, and other areas. The course begins by defining some basic concepts in genetics such as biochemical pathways, phenotypes and genotypes, chromosomes, and alleles. It will explain the characteristics of cells and organisms, DNA, RNA, and proteins. It will also describe genetic processes such as transcription, recombination and repair, regulation, and mutations. The topics on viruses and bacteria discuss their life cycle, diversity, reproduction, and gene transfer. Other topics covered include molecular evolution; the isolation, purification, detection, and hybridization of DNA; basic molecular cloning techniques; proteomics; and processes such as the polymerase chain reaction, DNA sequencing, and gene expression screening. Up to date topics to be treated include genetic engineering, genomics, and related areas, and also treats topics in medical, agricultural, and social aspects of molecular biology. *Lab included. Prerequisite: BIO-120 or BIO-122 or permission of the instructor.*

BIO-410 (4) Ecology
This course seeks to provide students with a basic understanding of ecology and its importance. The course will thus provide a basic synthesis of how individual organisms interact with their physical environment, and with each other, to generate the complex ecosystems we see around us. The unifying theme of the course is biodiversity-its patterns, causes, and the growing worldwide threats to it. Basic ecological principles will be presented using clearly described examples from the current ecological literature. Examples have been chosen carefully to represent as wide a range of ecosystems (terrestrial and aquatic, northern and southern hemisphere) and life forms (animal, plant and microbe) as possible.

Particular attention is paid to consequences of global change on organisms, populations, ecological communities and ecosystems. The expected outcome is the presentation of a persuasive picture of how the Earth's natural systems function, and how that functioning may change over the coming century if compliance in international climate change agreement fails.

BIO-411 (4) Ethnobotany
This course teaches ethnobotany as the study of the classification, use, and management of plants by people, and will draw on a range of disciplines, including natural and social sciences, to show how conservation of plants and of local knowledge about them can be achieved. It will also demonstrate how ethnobotany is critical to the growing importance of developing new crops and products such as drugs from traditional plants. The course will establish the basic introduction to the field, showing how botany, anthropology, ecology, economics and linguistics are all employed in the techniques and methods involved. It will explain data collection and hypothesis testing and will provide practical ideas on fieldwork ethics and the application of results to conservation and community development.

BIO-412 (4) Developmental Biology
The substance of this course on Developmental Biology embodies the breadth, the intellectual rigor, and the wonder of contemporary developmental biology. The course will introduce students to the field. It will integrate classical developmental biology with all the incredible advances that have been made in recent years. Students will be taught ''Integration'' as the key theme in developmental biology. The mechanisms of transcriptional gene regulation and of aging, the data on amniote limb development, the ways in which fertilization occurs, and the mechanisms of sex determination will each be integrated. Developmentally important genes will be "integrated" into genetic regulatory networks. The course will also highlight the importance of genomics, genetic regulatory networks, and digital visualization techniques in this field. Cytoskeletal dynamics, which integrate the genetic regulatory genes with morphogenetic events, will stress the discussions of neural development and cell signaling. Enduring Features: An evolutionary context will show the revolutionary new discoveries of the horizontal transfer of enhancer-bearing transposable elements as well as the possible origins of multicellularity as a developmental response to bacteria.

BIO-413 (4) Evolutionary Biology
This course on evolutionary biology offers a wide range of original ideas, based on articles and reviews on evolution, in the broadest sense of that term. The topics to be discussed will range from anthropology and behavior to molecular biology and systematics. A broad spectrum of topics to be discussed will include such subjects as natural selection among replicating molecules *in vitro*, mate recognition and the reproductive behavior of Drosophila, molecular systematics of *Crocodilia*, evolution of the monocotyledons, and the communication network made possible among even distantly related genera of bacteria by plasmids and other transposable elements.

Mathematics

MTH-118 (5) Introductory/Intermediate Algebra
Introductory Algebra will cover lessons pertaining to Real Number System, Expressions, Solving Equations, Polynomials, Factoring, Rational Expressions/Equations, Functions/Graphs/Applications, and Systems of Equations, More on Inequalities, Radical Expressions / Equations / Functions, and Quadratic Equations/Functions. The course will be integrated to other fields of study to make it real and relevant. At times, the learning process relating to the Navajo culture in the areas of Nitsahakees, Nahatah, Iina, and Sihasin will be covered as well as other cultures (multi-cultural studies). *Prerequisite: A grade of B or better in MTH113 or equivalent*.

MTH-315 (4 Credits) Biostatistics
This course is designed for students of biology, its allied disciplines, medicine or other health related areas. The course would motivate students to master the statistical methods that are most often used in the medical literature. It starts with an introduction of biostatics and its role in biomedical research, and proceeds through descriptive statistics, probability, statistical inference, to the concept of drawing random samples from populations. Basic methods of estimation, including confidence intervals will also be presented. Other topics would include hypothesis testing, nonparametric statistics, regression analysis, and analysis of variance (ANOVA). Methods of design for epidemiological studies and methods of analysis for person-time data would similarly be discussed. *Prerequisite: A grade of C or better in MTH-121 or an equivalent course or satisfactory placement score*.

Chemistry

CHM-470 (5 Credits) Organic Chemistry II with

Lab
The course is a continuum of CHM468 and develops to include topics involving preparative methods, retrosynthetic strategies, properties, reactions and spectroscopic features of aliphatic alcohols, ethers, aldehydes, ketones, dicarbonyl compounds, carbohydrates, carboxylic acids and derivatives, nitriles, nitroalkanes, amines, aliphatic sulfur compounds, and unsaturated compounds. Their aromatic counterparts and selected alicyclic compounds will also be discussed. Laboratory techniques will involve isolation and purification processes, determination of physical constants, spectroscopic methods and the interpretation of spectra. *Prerequisite: CHM 468.*

CHM-472 (4 Credits) Introduction to Biochemistry

The aim of this course is to satisfy the relevance of biochemistry to the medical profession. Topics to be reviewed are weak and strong chemical bonds, oxidation and reduction reactions, water, ionization, pH and buffers and biochemical energetics. Detailed studies include biochemistry of carbohydrates and metabolism (glycolysis, citric acid cycle, glycogenesis, glycogen metabolism, phosphogluconate pathway, fructose intolerance, galactosemia, glycogen storage diseases and stressing the clinical correlation of diabetes), proteins and enzymes including coenzymes and vitamins (amino acid metabolism highlighting amino acid oxidation, urea cycle, SGPT, SGOT, abnormalities of phenylalanine and tyrosine metabolism and PKU). Others include lipids; their metabolism and diseases, nucleotides/nucleic acids; their metabolism and diseases, blood; haemoglobinopathies and blood clotting. *Lab included. Prerequisite: BIO 302, or permission of the instructor.*

WELDING

WLD-101 (3) Welding Fundamentals I
Development of basic skills in shielded metal arc welding (SMAW), oxyacetylene cutting welding (OFC), and oxy-fuel welding (OFW) in accordance with the American Welding Society (AWS) entry level welder program will be covered. *Course Fee: $35.*

WLD-105 (3) Pipe Welding I
Students will acquire the knowledge to learn techniques for pipe fitting and pipe welding of joints using: SMAW, GMAW, GTAW, and FCAW, in the 2G welding position. They will also learn the set-up and adjustment of ARC and Oxy-Acetylene equipment. The welding safety procedures and terminology, skill development in laying weld beads with various patterns, position and processes. Perform 6010 electrodes root and 7018 electrodes fill and cap in 6G (stationary 45 degree angle) positions. Perform TIG root and 7018 electrode fill and cap on 2G and 6G pipe position, known as a combo weld.
Course Fee: $35.

WLD-115 (3) Structural Welding I
Emphasis on AWS entry and advanced level welder skills with SMAW, shielded metal arc welding process, including all position welding wild mild and stainless steel electrodes. In this welding course students will learn SMAW, welding codes, rod selection, reading basic, blueprints, calculating dimensions and completing layouts. Perform plate welding in various positions using 7018 electrodes. Perform Plasma and Carbon Arc cutting.
Prerequisite: WLD-101. Course Fee: $35.

WLD-125 (3) Structural Welding II
Advanced projects beyond Welding I in blueprint and layout, perform plate welding in various positions (2G horizontal welding, 3G vertical welding, 4G overhead welding) using 6010 electrodes for stringer and hot pass on T-plate. **Prerequisite* WLD-115
Course Fee: $35.

WLD-130 (3) Welding Fundamentals II
Development of basic Skills with gas metal arc welding (GMAW), metal insert gas (MIG), flux core arc welding (FCAW) in accordance with AWS entry level welder objectives/wire electrodes, shielding/purge gases, and modes of metal transfer will be discussed. *Course Fee: $35.*

WLD-150 (3) Pipe Welding II
Continuation of WLD-125, in these course students will acquire knowledge with groove welded joints in the horizontal fixed and 45-degree angle fixed positions (5-f, 5-G, 6-F, and 6-G). Students will learn how to define TIG welding. Learn operation requirements for portable equipment, weld test with lab procedures and testing approaches. Perform mild steel TIG welding on pipe in various positions (2G, 5G, 6G) using TIG stringer, fill, and cap. **Prerequisite WLD-105 Course Fee: $35*