

## Mechanics & Technology

The following matrix indicates those courses deemed transferable among institutions listed across the top of the matrix. The numbers on the matrix represent the number of semester hours associated with the course at each institution and which institutions have agreed to transfer the commonly numbered course in each row.

A list of the academic discipline liaisons contacts for each institution are listed at the bottom of this document.

### Electronic Technology

Prefix	Number	Course Title	BSC	LRSC	NDSCS
ELEC	100	Direct Current Analysis	4/1	4	5
ELEC	101	Alternating Current Analysis	4	4	4
ELEC	114	Digital Electronics I	3/1		
ELEC	115	Digital Electronics II	3/1		
ELEC	118	Solid State Devices I	4/1		
ELEC	120	AC Analysis	4/1		
ELEC	140	Semiconductor Circuit Analysis I			4
ELEC	144	Electronic Lab I			5
ELEC	145	Electronic Lab II			4
ELEC	216	Digital Electronics III	4/1		
ELEC	222	Electronic Communications I	4/1		
ELEC	224	Electronic Communications II	4/1		
ELEC	226	Electronic/Mechanical Practices	4/1		
ELEC	242	Linear Electronics			4
ELEC	244	Advanced Linear Systems			3
ELEC	248	Microcontroller Applications			4
ELEC	250	Graphical Programming for Electronics			4
ELEC	251	Network Operating Systems			2

Prefix	Number	Course Title	BSC	LRSC	NDSCS
ELEC	253	Introduction to Instrumentation			3
ELEC	254	Instrumentation and Control Systems			5
ELEC	255	Process Measurement and Control Valves			4
ELEC	261	Electronic Communications			5
ELEC	262	Electronic Communications II			3
ELEC	265	FCC License Preparation			1
ELEC	272	Introduction to Simulation		3	
ELEC	275	Visual Systems/Graphics		2	
ELEC	281	Digital Integrated Circuits		4	3-4
ELEC	282	Technical Simulation		3	
ELEC	284	Semi-conductor Devices		4	
ELEC	285	Electronic Circuits		3	

### **ELEC 100 Direct Current Analysis**

### **ELEC 101 Alternating Current Analysis**

### **ELEC 114 Digital Electronics I**

Study of electronic gates, Boolean algebra, and combination logic circuits. The operation of various logic devices and an introduction to the basic structure of a microprocessor-based system are covered. The lab portion of the course is a lab/lecture, which provides hand-on verification of the theory presented in class. Prerequisite: ELEC 100, 118 or equivalent and approval of instructor.

### **ELEC 115 Digital Electronics II**

An extension of ELEC 114, covering microprocessors, assembly language programming, interfacing, and applications of the microprocessor. The lab portion of the course is a lab/lecture, which provides hands-on verification of the theory presented in class. Prerequisite: ELEC 114.

### **ELEC 118 Solid State Devices I**

The study of semiconductor physics, fundamentals of semiconductors, power supplies, transistor fundamentals and transistor biasing. The lab portion of the course is lab/lecture, which provides hands on verification of the theory presented in class.

**ELEC 120 AC Analysis**

The study of small signal audio amplifiers and large signal audio amplifiers. Field effect transistors and operational amplifier characteristics and their application are also covered. The lab portion of the course lab/lecture, which provides hands-on verification of the theory presented in class.

**ELEC 140 Semiconductor Circuit Analysis I**

Familiarization with the operating principles of various devices using a PN semiconductor junction. Includes diodes, diode circuits, special purpose diodes, bipolar transistors, thyristors. Prerequisite: ELEC 100. Corequisite: ELEC 101.

**ELEC 144 Electronic Lab I**

A laboratory course which covers electronic fabrication, computer simulation of electrical circuits, and troubleshooting of electronic circuits.

**ELEC 145 Electronic Lab II**

A laboratory course which covers electronic fabrication, computer simulation of electrical circuits, and troubleshooting of electronic circuits.

**ELEC 216 Digital Electronics III**

Students will become familiar with the architecture, programming, application and troubleshooting of micro-controllers. Configuration of personal computers, including applications, basic networking, and troubleshooting. Basic data acquisition theory and practices are also covered. The lab portion of the course is a lab/lecture, which provides hands-on verification of the theory presented in class. Prerequisite: ELEC 214.

**ELEC 222 Electronic Communications I**

Review of reactive and resonant circuits, component and circuit noise generation, amplitude modulation generation and detection, single sideband generation and detection and radio frequency oscillators. The lab portion of the course is a lab/lecture, which provides hands-on verification of the theory presented in class. Prerequisite: Completion of first year of Electronics Technology program, or equivalent and instructor's approval.

**ELEC 224 Electronic Communications II**

Study of phase and frequency generation and detection, digital communications and modulation, transmission lines, antennas, and fiber optics. The lab portion of the course is a lab/lecture, which provides hands-on verification of the theory presented in class. Prerequisite: ELEC 222.

**ELEC 226 Electronic/Mechanical Practices**

Students will become familiar with common hand-tools and their proper use, wire, cable and fiber optic connectors and their assembly; soldering of surface mounted components; use and mounting of hardware; efficient use of schematics and how to troubleshoot selected pieces of equipment. The lab portion of the course is a lab/lecture, which provides hands-on verification of the theory presented in class.

**ELEC 242 Linear Electronics**

A lecture/lab study of linear devices and systems. Includes advanced usage of test equipment, considerable usage of op-amps and circuits and other linear applications. Prerequisite: ELEC 141.

**ELEC 244 Advanced Linear Systems**

A lecture/lab course continuing on the topics from ELEC 242 Linear Electronics. Topics to include switching power supplies and sensor theory and applications.

**ELEC 248 Microcontroller Applications**

A lecture/lab course on microprocessor-based systems. Concentrates on chip architecture and assembly language programming. The Intel microprocessor family is studied. Prerequisite: ELEC 281.

**ELEC 250 Graphical Programming for Electronics**

This course used LABVIEW, a graphical method of computer programming. It includes a study of the steps required to develop a computer program. The emphasis of these programs will be on applications related to the electronics industry.

**ELEC 251 Network Operating Systems**

Network Operating Systems is an intensive introduction to multi-user, multi-tasking network operating systems. Characteristics of the Linux, Windows 2000, NT, and XP network operating systems will be discussed. Students will explore a variety of topics including installation procedures, security issues, back up procedures and remote access. Prerequisite: CIS 219.

**ELEC 253 Introduction to Instrumentation**

This lecture/lab course deals with the basic concepts of process control. Emphasis is on closed loop proportional control systems.

**ELEC 254 Instrumentation and Control Systems**

This lecture/lab course covers the concepts of process control. Major topics are feedback, cascade, ratio, and feed forward control schemes. Operating the equipment used in control loops is included. Prerequisite: ELEC 141 or ECAL 102.

**ELEC 255 Process Measurement and Control Valves**

This lecture/lab course deals with the operation and function of devices used to measure the process output. Control valves and actuators are also included, as is the calibration of these devices.

**ELEC 261 Electronic Communications**

An introduction to the transmission of intelligence over distance by RF carrier. This includes the study of the limiting effects of frequency spectrum, noise, and bandwidth. RF generating devices, modulators, frequency synthesizers, and other RF circuitry are introduced. Various types of modulation is discussed. Prerequisite: ELEC 140 and ELEC 141.

**ELEC 262 Electronic Communications II**

A continuation of communications topics from ELEC 261 that includes digital modulation techniques, transmission line theory, RF propagation, and antenna theory. Two-way radio, basic television transmission, GPS, and satellite systems are also covered. Prerequisite: ELEC 261.

**ELEC 265 FCC License Preparation**

A course to assist the student in preparing for the Federal Communication Commission's General Radiotelephone License examination. This license is required for maintenance of transmitters in the aviation, maritime, or international broadcast field. Prerequisite: ELEC 261.

**ELEC 272 Introduction to Simulation**

An introduction to simulation techniques, including simulation, emulation, and imitation is provided. Reviews of applicable physics, aerodynamics, and computer

fundamentals are also provided. Other topics include an introduction to environment creation techniques, simulator architecture, hardware/software interface, mission development, and maintenance related tasks and skills.

**ELEC 275 Visual Systems/Graphics**

An introduction to visual displays systems, topics include system data flow and signal distribution, computer system (mainframe), computer system (input/output) to include priority interrupt module, buffer interface controller, transformation arithmetic scene controller (TASC), image processing equipment and display unit.

**ELEC 281 Digital Integrated Circuits**

A lecture/lab course in digital integrated circuits with industrial applications. Includes an introduction to computer systems.

**ELEC 282 Technical Simulation**

An in-depth examination of navigation, navigational procedures, flight instrumentation, and methods for simulation their characteristics and effects. Topics include preflight, methods of navigation control and landing, instrumentation, communications, and environmental/special effects. Prerequisite: ELEC 272.

**ELEC 284 Semi-conductor Devices**

Provides and analysis of active electronics devices to include transistors, thyristors, diodes, FET's, IC's as the building blocks for Oscillators, Detectors, power supplies, multi-vibrators, and amplifiers. Prerequisites: ELEC 100 and ELEC 101.

**ELEC 285 Electronic Circuits**

Concentrates on interpretation and understanding of schematic diagrams, electronic tables, data books, timing diagrams, and flow charts to facilitate expeditious identification and repair of circuit malfunctions. \*\*The thrust of this class will be to utilize all that has been learned, to aid troubleshooting. Prerequisites: ELEC 284, ELEC 281, and ELEC 272.

**Technology**

Prefix	Number	Course Title	LRSC	NDSCS	WSC
TECH	101	Engineering Drawing		2	
TECH	102	Charging and Starting Systems		3-4	
TECH	109	Air Conditioning		2	
TECH	118	Orientation			1
TECH	120	Applied Welding			1-2
TECH	130	Industrial Safety		2	

TECH	164	Introduction to Hydraulic Components and Systems		5	
TECH	165	Applied Fundamentals of Hydraulic Theory		5	
TECH	178	Heavy Duty Air Conditioning			2
TECH	184	Fuel Injection Systems		4	
TECH	238	Basic Welding	2-5		
TECH	265	Applied Hydraulic Systems		6	

### **TECH 101 Engineering Drawing**

An introduction and practice in the use of mechanical drawing instruments, freehand lettering techniques, sketching, orthographic projection, section views, auxiliary views, isometric and oblique projection, and basic dimensioning practices. It is a core drafting course for students going into a more specialized field such as mechanical drafting, or civil engineering technology.

### **TECH 102 Charging and Starting Systems**

A lecture, demonstration and performance type course covering the design and operation of charging and cranking systems. Included is the study of the operation, control, diagnosing, and repair of these systems. Emphasis is placed on the proper use of special instruments and tools to test and service the systems involved. This is a 9-week course.

### **TECH 109 Air Conditioning**

A lecture, discussion, and lab-type course covering the design and principles of operations of various air conditioning systems. Work in lab consists of leak detecting, evacuation, reclaiming, charging, component overhaul, component installation, electrical systems, and troubleshooting of various units. This is a 9-week course.

### **TECH 118 Orientation**

Safety in the operation of hand and power tools; proper selection and use of fire extinguishers; safety procedures and rules stressed. Employee right-to-know information will be discussed. Students will be developing small projects to use in the lab area.

### **TECH 120 Applied Welding**

Study and skill development of oxyacetylene welding (cutting, fusion, brazing); shielded metal arc welding of carbon steels in flat, vertical, overhead, horizontal positions; wire feed welding of carbon steels in various positions.

### **TECH 130 Industrial Safety**

A basic study covering occupational safety standards and codes with emphasis on applications to typical industrial, construction, and shop situations. Topics include: the role of OSHA and other regulatory agencies, fire protection, hazardous materials, personal protection, operations, and constructive safety, as well as the study of accident causation and prevention.

### **TECH 164 Introduction to Hydraulic Components and Systems**

A study of principles of operations and construction and functions of hydraulic components in open and closed center systems. Flowrate and calculate oil flows

and pressures on hydraulic units found on agricultural and industrial type hydraulics. This is a 9-week course.

**TECH 165 Applied Fundamentals of Hydraulic Theory**

A lab/lecture type course that covers the fundamental of hydraulic components and systems as they relate to diesel powered equipment. Students will disassemble, assemble, and test hydraulic components used with both open and closed center systems.

**TECH 178 Heavy Duty Air Conditioning**

Introduction to the theory and operation of air conditioning systems; practical application of theory and operation of air conditioning systems; safety in recovering, recycling, and handling of refrigerants stressed; special attention given to governmental regulations as to handling materials.

**TECH 184 Fuel Injection Systems**

A study of and exposure to different types of diesel fuel injection systems found on agricultural and industrial engines. Fuel system requirements, operation, disassembly, reassembly, and testing to procedure are covered. This is a 9-week course.

**TECH 238 Basic Welding**

Is designed to give the student a broad overview of safe work habits and to become aware of safe working conditions for welding as well as providing basic principles and practices in the fundamentals of shielded metal arc welding and oxyacetylene gas welding.

**TECH 265 Applied Hydraulic Systems**

A lab/lecture course covering the service and repair of the hydraulic functions on agricultural and other mobile equipment. Open center, closed center, and load sensing systems are covered as well as steering, hydrostatic drives, and hydraulic control functions of today's equipment.