



Electronics & Computer Technology

2 YEAR PROGRAM

HARKNESS

PROGRAM SUMMARY

- Do you want to learn about the latest technology in personal computing, cellular communications, HDTV, virtual reality, Bluetooth, game machines and car audio / video systems?
- Would you like to use soldering irons, hand tools, meters and oscilloscopes to build computers, robots, amplifiers, speakers, wireless devices, power supplies and other "high tech" projects?
- Can you picture yourself working with...
 - ✓ Personal and high performance gaming computers?
 - ✓ Robots on a factory production floor?
 - ✓ Drone planes for the government?
 - ✓ X-ray machines, MRI and CAT scanners in a medical facility?
 - ✓ Cellular and fiber optic communications networks?
 - ✓ Sound, lighting and special effects equipment on a major concert tour?

COLLEGE CREDIT CONNECTIONS

- Bryant and Stratton
- SUNY Canton
- SUNY Erie

SPECIAL NOTES

- Students are eligible to take the National Occupational Competency Testing Institute (NOCTI) and Federal Communications Commission (FCC) certification exams upon successful completion of this program.

PROGRAM ELIGIBILITY

- Technical Endorsement
- 3.75 Credits per Year
- Pathways to Graduation (CTE and CDOS)

Career Paths

PROFESSIONAL CAREERS

Biomedical Engineer
 Computer Engineer
 Design & Test Engineer
 Digital or RF Circuit Engineer
 Electrical Engineer
 Electrical Power Engineer
 Robotics Engineer
 Sales Engineer
 Software Engineer

TECHNICAL CAREERS

Audio - Video Equipment Installer
 Avionics Technician
 Broadcast Electronics Technician
 Electro - Mechanical Technician
 Electronics Technician
 Medical Electronics Technician /
 Equipment Repairer
 Repairer
 Robotics Technician

ENTRY LEVEL CAREERS

Cable Television Technician
 Electronic Sales Representative
 Electronics Assembler
 Electronics Bench Tester
 Satellite Systems Technician
 Security Alarm Installer
 Solar Panel Installer
 Telecommunications Installer

MICROCOMPUTER SYSTEMS

- I/O Peripheral Devices
- Central Processing Unit (CPU), Motherboard and Chip Sets
- RAM, ROM, BIOS, Magnetic and Optical Memory
- Power Supply Operation, Testing and Wattage
- Operating Systems (OS) Software Installation and Upgrades
- Processor Installation, Clock Speed, Overclocking and Cooling

AMPLIFICATION

- Gain and Frequency Response
- Bandwidth and Decibels
- Small Signal Amplifiers (Preamplifiers)
- Large Signal Amplifiers (Power Amplifiers)
- Amplifier Construction, Testing Troubleshooting and Repair
- Car and Home Theater Audio Systems

DIGITAL ELECTRONICS

- Binary Number System
- Logic Gates, Boolean Algebra and Combinational Logic
- ASCII Code, Short Message Service (SMS)
- Text Message Protocol
- Counters, Registers and Sequential Logic
- Logic Families (TTL, CMOS)
- Troubleshooting Digital Circuits (Logic Probe, Oscilloscope, DMM)

SOLDERING, DESOLDERING AND PCB REPAIR

- Metallurgy, Alloys, Eutectic Melting Point and Lead Free Solder
- Soldering Safety and Use of Personal Protective Equipment (PPE)
- Selection and Care of Soldering Irons
- Through Hole and Surface Mount Devices (SMD)
- Component Removal Using Solder Pump and Braid

SEMICONDUCTOR ELECTRONICS

- Conductors, Insulators and Semiconductors
- Chemical Doping and Production of P & N Type
- Semiconductor Material
- PN Junction Diode Constriction and Biasing
- Light Emitting Diode (LED)
- Bipolar Junction Transistor (BJT)
- Integrated Circuit Design, Construction, Packaging and Pin Identification

DC ELECTRONICS

- Sources of Electricity
- Voltage, Current and Resistance
- Ohm's Law
- Series, Parallel and Compound Circuits
- Voltmeter, Ohmmeter and Ammeter Measurements
- Power

AC ELECTRONICS

- Frequency, Period and Wavelength
- Frequency Spectrum, Audio Frequency (A.F.), Radio Frequency (R.F.) and Microwave
- Inductance and Capacitance
- Transformers, Step-Up, Step-Down, Isolation
- Tesla Coils
- Three Phase AC Power Systems, Delta, Wye

ANALOG / DIGITAL CONVERSION

- Analog to Digital Converter (ADC 0802)
- Digital to Analog Converter (DAC 0802)
- Sampling Rate, Resolution (8 and 24 bit), File Size
- Audio Conversion Formats (PCM, WAV, FLAC, MP3, MP4)
- Video Conversion Files (AVI, WMV, MPG)
- Video File Formats, Compression, CODEC

TELEPHONE AND CELLULAR COMMUNICATIONS

- Duplex, Simplex and Half-Duplex Transmission
- Line, Trunk and Central Office (CO)
- Cordless Telephone (902-928 MHz, 2.4 GHz ISM)
- Wireless Telephone, Spread Spectrum (1850-1990 MHz)
- 1G (AMPS), 2G (PCS), 3G and 4G (LTE) Wireless
- Cellular and Personal Communications Systems (PCS)

RADIO COMMUNICATIONS

- Oscillators, Hartley, Colpitts, Crystal, Microwave
- Transmitters, RF Frequency Spectrum, Federal Communications Commission (FCC), International Telecommunications Union (ITU)
- Modulation, Amplitude (AM), Frequency (FM), Pulse Width (PWM)
- Antennas and Transmission Lines, Microwave, RADAR and Satellite Communication Systems
- History of Radio, Nikola Tesla, Lee DeForest, Howard Armstrong, Guglielmo Marconi
- Receivers, Crystal and "Foxhole", Heterodyne, Superheterodyne, Block Diagrams