Electronics (ELT)

6ELT 100S DC/AC Supplemental Instruction

2 Hours

Prerequisites: Concurrent enrollment in ELT 102 or ELT 111

2 hours weekly (2-0)

This course is designed to provide both group and individual supplemental instruction. The purpose is to provide additional opportunity for student success in the Electronics program.

This is a skill building course and is not used to calculate GPA at John A. Logan College. In addition, it will not transfer.

ELT 102 Basic Electricity and Wiring

4 Hours

Prerequisites: None

6 hours weekly (2-4)

This course is designed to give students a basic understanding of industrial electricity and power systems to include industrial control circuits.

ELT 103 Applied DC/AC Circuits

4 Hours

Prerequisites: ELT 102

6 hours weekly (2-4)

This course is designed to introduce the student to applied DC/AC circuits. DC topics will include the study of Superposition Theorem, filters, Voltage dividers. AC circuit analysis will include sinusoidal sources, RMS calculations, resonant circuits, capacitive and inductive time constants, series and parallel resonance, and transformers will be covered. Students will use the theory learned in the classroom to design and construct circuits in the laboratory, computer simulation software will also be used. Test equipment will be used to take measurements and to perform basic trouble.

ELT 104 Introduction to VFDs

2 Hours

Prerequisites: ELT 102 with a grade of "C" or higher

3 hours weekly (1-2)

This course will introduce the student to variable frequency drive through theory and hands-on labs. The topics will include variable frequency drive safety, operation, setup, programming basic wiring and troubleshooting.

ELT 105 Introduction to Programmable Logic Controllers

3 Hours

Prerequisites: None

4 hours weekly (2-2)

This course introduces the student to Programmable Logic Controllers (PLCs) and Ladder Logic Programming. The student will create and troubleshoot ladder logic on a trainer that can simulate a variety of real-world systems.

ELT 109 Statistical Process Control

2 Hours

Prerequisites: None

2 hours weekly (2-0)

This course is designed to give students an understanding of quality and the use of statistical process control. Topics covered in this class include: quality, bar charts, Pareto diagrams, histograms, X-R charts, I-R charts, P charts, and process capability.

ELT 111 Digital Electronics I

3 Hours

Prerequisites: None

8 hours weekly (2-2)

This course will introduce students to basic digital technology systems. An understanding of the benefits of digital systems is examined. Number systems (binary, hexadecimal) and learned. Combinational logic gates including simplification using Boolean algebra and Karnaugh mapping are applied. Students receive hands on lab experiments throughout the course to confirm classroom lectures and textbook reading. Soldering exercises including some surface mount components are utilized. This course concludes with a comprehensive final project.

ELT 112 Digital Electronics II

3 Hours

Prerequisites: ELT 111 with a grade of "C" or higher

4 hours weekly (2-2)

Digital Electronics II presents specifications of integrated circuits for application in circuit designs that interface with real-word analog devices. Various display technologies and digital coding schemes are learned. Sequential logic design using flip flops prepares the student for synchronous and asynchronous circuit design in the last quarter. Students receive hands on lab experiments throughout the course to confirm classroom lectures and textbook reading. Soldering exercises including surface mount components are utilized. This course concludes with a comprehensive final project.

ELT 150 Applied Solid State Electronics

3 Hours

Prerequisites: ELT 102

4 hours weekly (2-2)

This course is designed to introduce the student to solid state devices, controls, and their applications. Basic theory of operation and troubleshooting practices will be introduced using meters and the oscilloscopes. Some of the devices covered will include diodes, thyristors, power supplies, transistors, operational amplifiers, and voltage regulators.

ELT 151 Applied Solid State Circuits

3 Hours

Prerequisites: ELT 150

4 hours weekly (2-2)

This course is designed to introduce the student to applied solid-state circuits. Topics include the AC analysis transistor amplifier. Op amps integrators and differentiators, and active filters. AM, FM, and fiber optic communication theory will be covered. Students will use the theory learned in the classroom to design and construct circuits in the laboratory.

ELT 170 Biomedical Instrumentation I

3 Hours

Prerequisites: ELT 102 and ELT 111 both with a grade of "C" or higher

4 hours weekly (2-2)

This course is one of three courses in a sequence that covers biomedical instrumentation and regulations. This course will cover safety, regulations, and monitoring systems.

ELT 180 Ethics in Technology

3 Hours

Prerequisites: None

3 hours weekly (3-0)

This integrated course provides a comprehensive exploration of ethical considerations spanning the broader landscape of technology and the specific realm of Information Technology (IT). Students will engage in critical discussions, case studies, and hands-on applications to develop a holistic understanding of ethical challenges in the design, development, and deployment of technology. The curriculum aims to equip participants with the ethical principles necessary to navigate the complex intersection of technology and society.

ELT 200 Introduction to Microprocessors

3 Hours

Prerequisites: ELT 102, ELT 111

4 hours weekly (2-2)

Students will learn how basic microprocessor architecture works including memory and math, and I/O systems. Computer languages from low to high level are explained. Embedded microcontrollers are introduced along with interfacing these modern systems in real-world applications.

ELT 201 PLC Manufacturing Systems and Industrial Robotics

3 Hours

Prerequisites: ELT 100 or 102 or consent of instructor

4 hours weekly (2-2)

This course gives the student hands-on experience with PLC systems. Included are certain technical and internal integration technologies utilizing automated manufacturing systems to demonstrate how CIM works in application. Supporting equipment will also be used.

ELT 205 Hydraulics and Pneumatics

3 Hours

Prerequisites: None

4 hours weekly (2-2)

A study of basic industrial fluid power systems common to automated industrial equipment, including hydraulic and pneumatic.

ELT 210 Supporting Computer Operating Systems

3 Hours

Prerequisites: None

4 hours weekly (2-2)

Supporting Computer Operating Systems examines the support needs of various industries including office environments, production facilities, and specialized applications of small computing devices such as tablets and smartphones. A history of operating systems is examined along with the importance of O.S. continuity with industrial robotics and specialized control systems. Windows and multiple Linux distributions are the primary operating systems students will install. Other elements of the course include disaster recovery, information systems security, customer service, and teamwork.

ELT 214 Fundamentals of Computing Hardware

3 Hours

Prerequisites: None

4 hours weekly (2-2)

Fundamentals of Computer Hardware validates knowledge of computer and server hardware

systems, emphasizing component identification, power systems, CPU variation, memory types, BIOS, storage systems, and internal and external data communication methods. Labs focus on building, upgrading, configuring, and troubleshooting computers. Other elements of the course include preventive maintenance, hardware security, and teamwork.

ELT 215 IOT and Embedded Systems

3 Hours

Prerequisites: ELT 102 and ELT 111 both with a grade of "C" or higher

4 hours weekly (2-2)

The course provides a comprehensive exploration of the interconnected world of IoT, where devices, sensors, and systems communicate and collaborate to transform industries and everyday experiences. This course delves into the history, networking protocols, hardware components, impact on internet infrastructure, and critical security and ethical considerations shaping the IoT landscape. Through a combination of theoretical learning, hands-on projects, and real-world case studies, students will gain the knowledge and skills necessary to navigate the dynamic and transformative IoT domain.

ELT 218 Introduction to Network Technologies

3 Hours

Prerequisites: None

4 hours weekly (2-2)

This course provides an introduction to fundamental concepts and technologies in computer and IoT networking. Students will explore the architecture, protocols, and components that underpin modern communication networks. The course will cover topics ranging from the history of networking to current trends in networking technologies. Through a combination of lectures, hands-on labs, and real-world case studies, students will gain a solid understanding of networking principles and practices.

ELT 220 Special Projects in Electronics

3 Hours

Prerequisites: ELT 102 and ELT 111

4 hours weekly (2-2)

This course will introduce the student to applied metrology of common test equipment, including DMMs, oscilloscopes, spectrum analyzers, signal generators, and RLC bridges. Projects utilizing both analog & digital components will be designed, built, tested, and troubleshot. Programmable logic devices and hardware design languages will be utilized. Data compression, error detection/correction, and authentication will also be covered. Other topics deemed worthy of interest/discussion by the instructor may be covered as time permits.

ELT 222 Applications of Artificial Intelligence

3 Hours

Prerequisites: ELT 102 & ELT 111

4 hours weekly (2-2)

This course introduces students to the practical applications of Artificial Intelligence (AI) in various domains, equipping them with the skills necessary to design, implement, and deploy AI solutions. The curriculum emphasizes research on the topic of AI along with current applications of microcontrollers, IOT devices, traditional computers, and cloud computing to provide hands-on experience and real-world problem-solving essential for applied AI.

ELT 224 Power Distribution and Motors

3 Hours

Prerequisites: ELT 102 or consent of instructor

4 hours weekly (2-2)

This course will be concerned with power distribution systems and motor loads. Both three phase and single phase will be discussed.

ELT 243 Renewable Energy Systems

3 Hours

Prerequisites: ELT 102 or HAC 102 with a minimum grade of "C"

4 hours weekly (2-2)

Students will develop knowledge in the solar energy technologies field. They will learn the various types of solar systems and how to set up a solar energy system. Also general maintenance and cost calculations will be covered.

ELT 250 Biomedical Instrumentation II

3 Hours

Prerequisites: ELT 102 with a minimum grade of "C"

ELT 111 with a minimum grade of "C"

4 hours weekly (2-2)

This course is one of three in a sequence that covers biomedical instrumentation and regulations. This course covers laboratory, life support, portable, and therapeutic equipment.

ELT 270 Introduction to Smart Grid

3 Hours

Prerequisites: ELT 102 or HAC 102 with a minimum grade of "C"

4 hours weekly (2-2)

This course will explore smart grid technology and how it applies to today's industries. The use of smart grid technology can help residential and commercial individuals to be more aware of their energy usage. Topics covered in this course will include: safety, traditional grid construction and operation, Smart grid operation, Smart grid communications, retrofits that may enhance energy management effectiveness for smart grid users & an over view of green energy systems building codes and compliance requirements. Also included will be hands-on labs that will allow the student to gain experience using today's industry hardware.

ELT 280 Biomedical Instrumentation III

3 Hours

Prerequisites: ELT 250 with a grade of "C" or higher

4 hours weekly (2-2)

This course is a continuation of Biomedical Instrumentation I and II and covers operating room equipment, diagnostic imaging equipment, medical specific test equipment and healthcare information technology for technicians.