INSTRUMENTATION-BAS

Program Overview

Bachelor of Applied Science - Instrumentation

Student Learning Outcomes

The Bachelor of Applied Science (BAS) in Instrumentation Technology program is designed to provide students with advanced technical skills and comprehensive knowledge of instrumentation systems, measurement, and control processes used in modern industrial environments. The program equips graduates with the ability to work in high-demand industries, including manufacturing, power generation, mining, and process automation, ensuring they are ready for leadership and specialized technical roles.

Graduates of the BAS in Instrumentation Technology program will have the knowledge, skills, and competencies to:

- Advanced Measurement and Control – Understand and apply measurement and control systems to regulate temperature, pressure, level, and flow in industrial processes.
- Industry Terminology and Standards – Interpret specialized terms and standards (including ISA) to communicate effectively and ensure compliance in industrial settings.
- Measurement Device Selection – Choose the right measurement devices and sensors for different applications, ensuring accuracy and reliability.
- Feedback Control System Design – Design and optimize feedback control loops using PID control to improve system stability and process efficiency.
- ISA Standards and Documentation – Use ISA standards to interpret and create technical documents, symbols, and schematics for instrumentation systems.
- Calibration and Maintenance – Calibrate, align, and maintain pressure and temperature transmitters to ensure accurate system measurements.
- Pneumatic Systems – Install, calibrate, and maintain pneumatic instruments while understanding their role in control systems.
- Troubleshooting and Optimization – Diagnose and troubleshoot issues in instrumentation systems, improving performance through data analysis and diagnostics.
- Process Automation Integration – Integrate instrumentation systems into process automation networks to optimize real-time data analysis and enhance system performance.
- Safety and Regulatory Compliance – Follow safety regulations, perform hazard analysis, and promote a culture of safety in the workplace.
- Leadership and Project Management – Lead instrumentation projects, manage teams, schedules, and ensure quality and timely completion of tasks.
- Professional Development and Certification – Prepare for industry certifications (like CCST) and stay updated with advancements in instrumentation and process automation.

Prerequisite: AAS or Certification in Electrical Systems Technology (or equivalency, based upon instructor approval). If students enter the program with appropriate technical skills but lack an official AAS or CA from an accredited institution, they will be required to complete one course in each of the following three areas:

- MATH 116, 116E
- BUS 110, PSY 208, or MGT 283
- COM 113 or ENG 100, 101, 107, or 108, determined by placement testing.

Non-traditional credit or credit by examination may be possible. See an advisor for more information

For more information about any School of Industrial Technology and Workplace Development programs, contact 775-327-2167.

General Education Requirements

Communications (one course required)

COM 113 Fund Speech Communication 3 Credits
Principles and theories of speech communication. Participation in public speaking and interpersonal communication activities.

THTR 102 Introduction to Stage Voice 3 Credits
Fundamentals of voice production including relaxation, alignment, breath, resonance, and articulation. Vocal health and the physiological aspects of voice/speech production. Students will complete performance projects.

THTR 221 Oral Interpretation 3 Credits
Introduction to and practice of oral interpretation of literary and dramatic works from Shakespeare to contemporary writers and poets.

English

ENG 333 Prof Communications 3 Credits
A course in applied rhetoric for students to develop the writing and communication skills they will need as professionals. The goal is to make strong writers with flexible analysis, writing, and oral communication skills.

Ethics

PHIL 311 Professional Ethics **3 Credits**
A study of the nature of ethical thinking and its application to judgments about actions of people that make up society. Topics to be considered include ethical relativism, moral virtues and vices, foundations of morality, alternative theoretical perspectives on moral judgment, egoism, altruism, and legal and regulatory perspectives related to ethics in business. (Formerly offered as ECON 311)

Mathematics (one course required)
MATH 181 Calculus I **4 Credits**
The fundamental concepts of analytic geometry and calculus functions, graphs, limits, derivatives, integrals, and certain applications. It is recommended that students have completed prerequisites within two years of enrolling in this course.

STAT 152 Intro to Statistics **3 Credits**
Includes descriptive statistics, probability models, random variables, statistical estimation and hypothesis testing, linear regression analysis, and other topics. Designed to show the dependence of statistics on probability. It is recommended that students have completed prerequisites within two years of enrolling in this course.

Mastery Course Requirements

Humanities (one course required)
HUM 301 Studies in Humanities **3 Credits**
An examination of various topics and subjects in the Humanities including art, literature, music, film, theater and others.

INT 339 Integrative Humanities Seminar **3 Credits**
An integrative seminar on topics in the humanities. The topics will vary to address needs and interests of programs. Course fulfills the upper-division integrative humanities general education requirements. May be repeated once for credit if the topics are different.

Mathematics (one course required)
MATH 389 Special Topics in Mathematics **3 Credits**
Covers specialized topics in Mathematics. Course may be repeated up to six credits if topics are different.

INT 359 Integrative Math Seminar **3 Credits**
An integrative seminar on topics in mathematics. The topics will vary to address needs and interests of programs. May be repeated once for credit if the topics are different.

Science (one course required)
GEOL 335 Earth Resources/Environment **3 Credits**
Geological availability, exploitation, and use of nonrenewable natural resources including metallic minerals, nonmetallic, and energy resources.

INT 369 Integrative Science Seminar **3 Credits**
An integrative seminar on topics in science. The topics will vary to address needs and interests of programs. Course fulfills the upper-division integrative science general education requirements. May be repeated once for credit if the topics are different.

PHYS 152 Gen Physics II **4 Credits**
A continuation of PHYS 151. Topics include electrostatics, circuits, magnetism, induction, AC circuits, electronics, light optics, special relativity, and an introduction in quantum theory. Lab included.

PHYS 181 Physics Scientist/Engr II **4 Credits**
A calculus-based investigation of thermodynamic laws, kinetic theory, electric charge, field, potential, current, dielectrics, circuit elements, magnetic fields and materials, electromagnetic oscillations. Lab included.

Social Science (one course required)
ANTH 307 Ancient Civilizations **3 Credits**
An exploration of the world's first civilizations and states in Africa, Eurasia and the Americas - the general trends in select regions and coverage of key archaeological sites. A review of theoretical perspectives on the rise and collapse of states along with techniques used in archaeology. This course satisfies the requirements for INT 349.

ANTH 332 (De)Constructing Race **3 Credits**
This course examines the concept of race from an anthropological perspective¿it is an exploration of the biological basis for human variation, the construction of racial categories, the nature of social hierarchy and inequality, and the role of race in systemic inequalities (i.e., education, economics, environment, health security, the legal system, the policing system, food security, housing, political organization, and so on) in the United States and elsewhere. This course satisfies the requirements for INT 349.

HIST 303 Worlds of Islam **3 Credits**
Introduces the theology and culture of early Islam. Examines the history of the 'rightly guided caliphs' era, the Umayyad and Abbasid periods, the Ottoman dynasty and others. Explores recent regional variations in Islam. This course satisfies the requirements for INT 349.

HIST 312 Expansion of the U.S. 3 Credits
This course will examine the expansion and growth of the United States with emphasis on westward movement and increased international presence over time. Emphasis will be placed on U.S. expansion across North America and beyond. This course satisfies the requirement for INT 349.

HIST 341 Global China 3 Credits
The outward flow of Chinese culture, cash, power, and people have profoundly influenced world history for thousands of years. This course examines the history of China in a global context from the Qin era to the present with a special focus on modern times and various Chinese migrations. This course satisfies the requirements for INT 349.

INT 349 Integrative Social Science Sem 3 Credits
An integrative seminar on topics in the social sciences. The topics will vary to address needs and interests of programs. Course fulfills the upper-division integrative social sciences general education requirements. May be repeated once for credit if the topics are different. ANTH 307, ANTH 332, HIST 303, HIST 341, and PSY 313 also fulfill the INT 349 requirement.

PSY 313 Well-Being: East Meets West 3 Credits
This course will cover topics pertaining to well-being from both a western psychological viewpoint, and an eastern perspective. Topics covered include, but are not limited to: positive psychology, mindfulness, joy, gratitude, cognition, spirituality, health, attachment, and emotions. The focus will be on integrating concepts from both the East and West to arrive at an understanding of what contributes to the well-being of individuals. This course satisfies the requirements for INT 349.

Applied Science Core Requirements

FIN 310 Applied Accounting and Finance 3 Credits
Course is designed to provide the student with the keys, concepts, and tools used in understanding the financial functions of a business enterprise. For those students with no previous education or experience in accounting, the course will include an introduction to the essential concepts necessary in understanding formal financial statements from the user's perspective.

MGT 310 Found of Mgt Theory/Pract 3 Credits
Develops the students' theoretical foundation for further study in any field involving management. Explores historical thought and the management functions of planning, organizing, directing, and controlling. Provides a practical analysis of leadership, communications, and motivation techniques. Concludes with an exploration of current management challenges and trends.

One course required

MGT 323 Organiz/Interperson Behav 3 Credits
A study of the interpersonal relations between individuals and groups in an organizational setting. Topics include leadership styles and techniques, organizational design, communication, decision making, motivation, perception, group behavior, and coping with stress.

MGT 367 Human Resource Management 3 Credits
Analysis of the personnel policies of business enterprises. Areas of study include recruitment, selection, placement, training, promotion, morale, employee services, compensation, labor relations, and organization and function of human resource departments.

Program Emphasis Requirements

EIT 233 Intro to Instrumentation 3-4 Credits
Successful completion of this course will provide the student with an understanding of the concepts of instrumentation as used in industry and why the accompanying skills are an exciting and highly sought after trade. Common pneumatic and electronic instruments that are used to control processes in refineries, power plants, mines, and most manufacturing facilities will be discussed.

EIT 240 Adv Topics in Instrument 2 Credits
Focuses on some of the more specialized instrumentation systems found in industry such as analyzers, weight scales, and wireless systems. Analyzer applications for pH, CO, CO2, NOx, SO2, HCN, and conductivity are becoming more critical to plant processes for environmental reasons. Weight scales are necessary for raw material accounting and inventory. Wireless systems are increasingly demonstrating their usefulness in low cost installations as security issues are resolved.

EIT 315 Pres/Lev/Flw Measurement 4 Credits
Exploration of the physics of pressure, level, and flow. Calculations are derived from formulas that pertain to fluids and solids and used to configure instruments for the purpose of process control. The types of instruments that are presented in this course are found in every industry that produces or manufactures a product. Labs will consist of configuring and calibrating instrumentation to precise standards based on the theory learned in the class lecture.

EIT 323 Installation and Configuration 3 Credits
Provides students with an understanding and practical application of safe and efficient methods of installation and maintenance of process instrumentation. Includes instrument piping, electrical wiring, and mechanical structures as related to physical, chemical, electrical, hydraulic, and pneumatic processes. Configuration of control loop elements is included with detailed exercises on 'live' trainers.

EIT 333 Prcss & Instrmnt Diagram 3 Credits
P&ID drawings are integral to understanding how manufacturing process works. P&IDs are the prelude to loop diagrams and other various schematics. All of these drawings are used by technicians for troubleshooting, wiring, and tubing. AutoCAD drafting basics are required to develop P&ID and loop drawings.

EIT 336 Control Valves/Regulators 4 Credits
The theory and operation of valves and associated pneumatic and hydraulic devices used in the control of gasses and fluids.

EIT 348 Temp Measure & Control **3 Credits**
The measurement and control of industrial heat and temperature processes.

EIT 368 Measurement Sys Analysis **2 Credits**
Designed to demonstrate the importance of accurate and reliable measurements in process control systems. Covers how to deal practically with inaccuracies and the methods to minimize the downside effects of inadequate measurement systems.

EIT 437 Intro to Control Systems **3 Credits**
Successful completion of this course will provide the student with an understanding of the concepts pertaining to analog control using Programmable Logic Controllers. Selection of hardware including processor architecture, input/output module wiring, programming, controller installation, and system troubleshooting. Students will learn PID control systems by utilizing PLC hardware/software in a 'live' process. Loop tuning methodology, controller feed-forward, feedback, cascade, and ratio control will be incorporated on process simulators.

EIT 468 Advanced Control Systems **3 Credits**
This course provides in-depth instruction in the design, development, and troubleshooting of programmable logic controllers (PLC), and distributed control systems (DCS) projects utilizing human machine interfaces (HMI) applications. Hands on hardware setup, programming, process monitoring and troubleshooting, and configurations of industrial networking.

MGT 441 Qual Control/Problem Solv **3 Credits**
Operational quality control and problem solving in the workplace.

Suggested Course Sequence

1st Semester - Fall

Course Credits BUS 110 3 ELM 113 3.5 ELM 120 3 ELM 121 2 ELM 122 4 ELM 124 2 ELM 128 4 ELM 141 2 ELM 142 2.5 English/Communications* 3-5 Humanities/Fine Arts* 3 Mathematics* 3-6 PSC 101 3 TOTAL 38 *Choose with advisor

2nd Semester - Spring

Course Credits ELM 123 2 ELM 125 2 ELM 126 2 ELM 127 2.5 ELM 131 2.5 ELM 132 2 ELM 133 4 ELM 134 2.5 ELM 135 1 ELM 136 2.5 ELM 143 3 English/Communications* 3 Science* 3 TOTAL 32 *Choose with advisor

3rd Semester - Fall

Course Credits EIT 233 4 EIT 315 4 EIT 323 3 EIT 333 3 EIT 368 2 TOTAL 16

4th Semester - Spring

Course Credits BUS 102 or MGT 103 3 EIT 240 2 Mastery Course* 3 EIT 336 4 EIT 348 3 EIT 437 3 EIT 468 3 TOTAL 21 *Choose with adviosr

5th Semester - Fall

Course Credits Communications* 3 MGT 310 3 Mastery Course* 3 PHIL 311 3 Mathematics* 3-4 ENG 333 3 TOTAL 19 *Choose with advisor

6th Semester - Spring

Course Credits Mastery Course - Science` 3-4 Mastery Course* 3 FIN 310 3 MGT 323 or 367 3 MGT 441 `3 TOTAL 15-16 *Choose with advisor