GPTC BAS PROGRAM CORE COMPETENCIES

National Science Foundation
Advanced Technological Education
B.E.S.T. Center Winter Workshop 2013

COLLEGE-LEVEL COMPETENCIES

Georgia Piedmont Technical College identifies College-level Core Competencies expected of graduates. These Core Competencies are embedded and assessed throughout and within programs of study and courses in the Division of General Studies.

Effective Communication

- Demonstrate an ability to read and listen with comprehension
- Speak and write clearly using Standard English
- Interact cooperatively with others using both verbal and non-verbal means
- Demonstrate information processing through basic computer skills

Analytical Competencies

- Analyze information and/or data into systematic parts
- Identify relationships between concepts and put them in logical and/or sequential order
- Demonstrate an ability to organize and integrate information from different sources
- Draw logical conclusions based on analysis of data and information
- Make connections and logical conclusions in learning across disciplines

Independent Learning

- Use appropriate search strategies and resources to find, evaluate, and use information
- Apply learning in academic, public, and personal situations

Informational Literacy

- Identify and refine information for investigation and query
- Evaluate information from different possible sources on the basis of accuracy, validity, and appropriateness for needs
- Extract relevant information from a source

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BAS PROGRAM CORE COMPETENCIES

Demonstrate the ability to correctly and safely install control devices	BUAS 2030
Effectively troubleshoot control device problems	BUAS 2020
Develop a control system database	BUAS 2040
Interpret construction drawings and specifications	BUAS 2030
Develop a controls submittal based on plans and specs	BUAS 2030
Interpret and analyze complex schematic and pictorial diagrams	BUAS 2020
Install network cabling to support control system communication	BUAS 1050
Build a complex control panel consisting of relays, controllers, and various control devices	BUAS 2020
Terminate all standard input/output types to a building automation system	BUAS 1040
Properly tune a proportional/integral controller loop	BUAS 2010
Exhibit effective oral and written communications	ALL COURSES
Identify and classify commonly-used building automation devices	BUAS 1040

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BAS PROGRAM CORE COMPETENCIES

General Studies Courses (Review)

Diploma Option

COMP1000(3): Introduction to Computers
COLL 1500(1): Strategies for Student Success
EMPL 1000(2): Interpersonal Relations & Professional Develop.
ENGL 1010(3): Fundamentals of English I
MATH 1013(3): Algebraic Concepts

Degree Option

COMP1000(3): Introduction to Computers
COLL 1500(1): Strategies for Student Success
ENGL 1101(3): Composition & Rhetoric

HUMN 1101(3): Introduction to Humanities
MATH 1111(3): College Algebra
MATH 1113(3): Pre-Calculus
XXXX XXX(3): Social Science Elective

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BAS PROGRAM CORE COMPETENCIES

Core Courses (Review)

Diploma Option

AIRC 1005(4): Refrigeration Fundamentals
AIRC 1010(4): Refrig. Principles & Practices
AIRC 1020(4): Refrig. Systems Components
BUAS 1010(2): BAS Fundamentals
BUAS 1020(3): BAS Electrical Concepts I
BUAS 1030(3): BAS Electrical Concepts II
BUAS 1040(3): BAS Devices
BUAS 1050(3): BAS Network Architecture
BUAS 1060(3): BAS Advanced Elec. Concepts
BUAS 2010(3): BAS Comm. HVAC/R & Ctrls
BUAS 2020(3): BAS Logic & Programming
BUAS 2030(4): BAS Design & Installation

Degree Option

AIRC 1005(4): Refrigeration Fundamentals
AIRC 1010(4): Refrig. Principles & Practices
AIRC 1020(4): Refrig. Systems Components
BUAS 1010(2): BAS Fundamentals
BUAS 1020(3): BAS Electrical Concepts I
BUAS 1030(3): BAS Electrical Concepts II
BUAS 1040(3): BAS Devices
BUAS 1050(3): BAS Network Architecture
BUAS 1060(3): BAS Advanced Elec. Concepts
BUAS 2010(3): BAS Comm. HVAC/R & Ctrls
BUAS 2020(3): BAS Logic & Programming
BUAS 2030(4): BAS Design & Installation
BUAS 2040(5): BAS Integration
BUAS 2050(5): BAS Internship

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BAS PROGRAM CORE COMPETENCIES

General Studies Courses for A.A.S. Degree

Courses	Why?
COMP1000(3): Introduction to Computers	Required for A.A.S.
COLL 1500(1): Strategies for Student Success	Required for A.A.S.
ENGL 1101(3): Composition & Rhetoric	Required for A.A.S.
HUMN 1101(3): Introduction to Humanities	Required for A.A.S.
MATH 1111(3): College Algebra	Required for A.A.S.
XXXX XXX(3): Social Science Elective	Required for A.A.S.
MATH 1113(3): Pre-Calculus	Specifically Selected

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BAS PROGRAM CORE COMPETENCIES

Core Courses for A.A.S. Degree

Courses	Why?
AIRC 1005(4): Refrigeration Fundamentals	Refrigeration fundamentals
AIRC 1010(4): Refrig. Principles & Practices	Use of gauges / Brazing
AIRC 1020(4): Refrig. Systems Components	Understanding of components / EPA certification prep.
BUAS 1010(2): BAS Fundamentals	Careers in BAS / I/O basics
BUAS 1020(3): BAS Electrical Concepts I	Electrical introduction / I/O ckts.
BUAS 1030(3): BAS Electrical Concepts II	Electrical intro. / Motors
BUAS 1040(3): BAS Devices	Intro. to BAS devices / suppliers
BUAS 1050(3): BAS Network Architecture	IT fundamentals / Network +
BUAS 1060(3): BAS Advanced Elec. Concepts	Reactive ckts / power analysis / troubleshooting / oscilloscopes
BUAS 2010(3): BAS Comm. HVAC/R & Ctrls	Comm. Systems / Ctrl. Theory
BUAS 2020(3): BAS Logic & Programming	Logic / ALICE / Java
BUAS 2030(4): BAS Design & Installation	Hands-on installation & design
BUAS 2040(5): BAS Integration	Lon / BACnet / Modbus / Niagara
BUAS 2050(5): BAS Internship	On-the job training

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BAS PROGRAM CORE COMPETENCIES

BAS Fundamentals - BUAS 1010

Competencies

- History of BAS industry
- Scope of BAS industry
- Categories of commercial building systems
- Contracting basics
- Types of companies in BAS (contractors / OEMs / suppliers / etc.)
- Career pathways in BAS
- Skills sets required for BAS pathways
- Intro to BAS I/O
- Hierarchy of BAS controls
- BAS architecture diagrams
- Trends in BAS

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BAS PROGRAM CORE COMPETENCIES

BAS Electrical Concepts I - BUAS 1020

Competencies

- Metric units
- Scientific notation
- Atomic theory
- Charge
- Voltage / Current / Resistance / Ohm's Law
- Conductors / Insulators
- Basic electrical circuits
- Electrical safety
- Electrical measurement devices
- Series circuits
- Parallel circuits
- Series / Parallel circuits
- Electrical Energy
- Electrical Power

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BAS PROGRAM CORE COMPETENCIES

BAS Electrical Concepts II - BUAS 1030

Competencies

- Power supplies
- Reactive electrical component introduction
- Power distribution
- Circuit protection
- Electric motor theory
- Electric generator theory
- Types of electric motors
- Motor starters
- Switching devices
- Electrical symbols
- Pictorial diagrams
- Schematics
- Sequences of operation

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BAS PROGRAM CORE COMPETENCIES

BAS Devices - BUAS 1040

Competencies

- Standard Input & Output wiring
- Temperature devices
- Humidity devices
- Pressure devices
- Flow devices
- Life & Equipment safety devices
- Actuators & dampers
- Control valves
- Power supplies
- Transducers
- Relays & Contactors
- Motor controls
- Enclosures
- Power monitoring devices

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BAS PROGRAM CORE COMPETENCIES

BAS Networking - BUAS 1050

Competencies

- Network fundamentals
- Standards organizations
- OSI model
- Internet Protocol
- Network signal transmission
- Network media
- Cabling standards
- Protocols
- Physical topologies
- Logical topologies
- Network hardware
- BAS network types & application

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BAS PROGRAM CORE COMPETENCIES

BAS Advanced Electrical - BUAS 1060

Competencies

- Voltage dividers
- DC voltage & current sources
- Simplification theorems
- AC current & voltage
- Oscilloscope fundamentals
- Reactive components
- Reactive circuits
- Basic filters
- Electrical assessment tools
- Ladder logic
- Shop drawings
- Microsoft Visio fundamentals

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BAS PROGRAM CORE COMPETENCIES

BAS Comm. HVAC & Ctrls - BUAS 2010 Competencies

- Psychrometrics
- All-air systems
- All-water systems
- Air & Water systems
- Boiler principles & types
- Chiller principles & types
- Water-side devices
- Air-side devices
- Control theory
- Control systems standards
- Applied control theory
- Control loop theory (PID)
- Control loop application

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BAS PROGRAM CORE COMPETENCIES

BAS Logic & Programming - BUAS 2020 Competencies

- History of logic
- Logical form
- Truth tables
- Boolean expressions
- Combinational Boolean logic
- Digital logic circuits & application
- Programming introduction
- Common elements of programming languages
- Object-oriented programming
- Data types
- Programming style
- Decision-making in programs / conditionals
- Modular design

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BAS PROGRAM CORE COMPETENCIES

BAS Design & Installation- BUAS 2030 Competencies

- BAS Contracting
- NEC code
- Control system design process
- Device selection
- Control system installation
- Installation tools & devices
- Conduit bending
- Cable pulling
- Control system praxis – Design, install, commission a control system

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BAS PROGRAM CORE COMPETENCIES

BAS Integration - BUAS 2040

Competencies

- OSI Model review
- TCP / IP review
- Network packets
- Modbus
- LonWorks
- BACnet
- Niagara platform

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BAS PROGRAM CORE COMPETENCIES

BAS Internship - BUAS 2050

Competencies

- Field training

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MATERIALS OF GPTC BUAS PROGRAM

BAS Course (Cr. Hrs. / CRN #)	*Textbook Title*	*ISBN 13#*	*Author / Publisher*
BUAS 1010 (2 / 48936) **BAS Fundamentals**	Materials Provided		
BUAS 1020 (3 / 48937) **BAS Electrical Concepts I**	"AC/DC Principles" "AC/DC Principles Workbook" "Troubleshooting Elect. Systems"	978-0-8269-1350-0 978-0-8269-1351-7 978-0-8269-1791-1	Paul T. Shultz / ATP ATP Staff Mazur & Proctor / ATP
BUAS 1030 (3 / 48938) **BAS Electrical Concepts II**	"AC/DC Principles" "AC/DC Principles Workbook" "Troubleshooting Elect. Systems"	978-0-8269-1350-0 978-0-8269-1351-7 978-0-8269-1791-1	Paul T. Shultz / ATP ATP Staff Mazur & Proctor / ATP
BUAS 1040 (3 / 48939) **BAS Devices**	Materials Provided		
BUAS 1050 (3 / none yet) **BAS Network Architecture**	"CompTIA Network+ 2009"	978-1-59863-878-3	Dean / Cengage Learning
BUAS 1060 (3 / 48940) **BAS Adv. Electrical Concepts**	"AC/DC Principles" "AC/DC Principles Workbook" "Troubleshooting Elect. Systems" "Industrial Electrical Troubleshooting"	978-0-8269-1350-0 978-0-8269-1351-7 978-0-8269-1791-1 978-0-7668-0603-0	Paul T. Shultz / ATP ATP Staff Mazur & Proctor / ATP Lundquist / Delmar
BUAS 2010 (3 / 48941) **BAS Commercial HVAC Systems & Controls**	"Mech. & Elect. Equip. for Buildings, 2e" "HVAC Control Systems" "HVAC Ctrl Systems Wrkbk" Building Automation Control Devices & Applications	978-0-470-19565-9 978-0-8269-0757-8 978-0-8269-0758-5 978-0-8269-2000-3	Stein / Wiley Auvil / ATP Auvil / ATP NJATC / ATP
BUAS 2020 (4 / 48942) **BAS Logic & Programming**	"Starting out with Alice, 2e" "Starting out with Java, 4e"	978-0-321-54587-9 978-0-13-608020-6	Gaddis / Addison-Wesley Gaddis / Addison-Wesley
BUAS 2030 (4 / 48943) **BAS Design & Installation**	"NEC 2011 Handbook" "Comm. & Ind. Wiring" "Ugly's Elect. Ref. 2011" "Ugly's Elect. Safety & NFPA 70E" "Ugly's Elect. Motors & Controls" "Ugly's Conduit Bending"	978-0-8776-5916-7 978-0-8269-2075-1 978-0-7637-9099-8 978-0-7637-6855-3 978-0-7637-7254-3 978-0-7637-8314-3	Early & Sargent / NFPA Barnett / ATP Jones & Bartlett Publishers Jones & Bartlett Publishers Jones & Bartlett Publishers Stanfield / Jones & Bartlett
BUAS 2040 (5 / 48944) **BAS Integration**	Building Automation System Integration with Open Protocols	978-0-8269-2012-6	NJATC / ATP
BUAS 2050 (5 / 48945) **BAS Internship**	No textbook required		