

GPTC BAS PROGRAM STRUCTURE



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



GPTC BAS PROGRAM STRUCTURE

Diploma Option

Building Automation Systems Technician

Building Automation Systems Technician – Diploma Program

Program Description

The Building Automation Systems Technician program prepares students for a career in the building automation systems industry. This industry encompasses a broad range of current and emerging technologies to control buildings electrical and mechanical systems efficiently. The program prepares students to enter the building automation industry capable of marketing, installing, designing, servicing, and troubleshooting complex commercial control systems. Students will have demonstrated proficiency in HVAC/R commercial systems, control theory, logic and programming, installation, system design, and integration. Graduates have also completed an industry-based internship course which is coordinated through the program.

http://www.gptc.edu/content.cfm?PageCode=program_detail&programID=12

GPTC BAS PROGRAM STRUCTURE

Associate of Applied Science Option

Building Automation Systems Technician

Building Automation Systems Technician – Degree Program

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GPTC BAS PROGRAM STRUCTURE

General Studies Courses

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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Core Courses

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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Building Automation Systems Program (All Tools Listed are Required for Each BAS Course)

Required Tool List for Program

(pdf packet)

- 1/ Tool Box
- 2/ Refrigeration Gauges with Quick Couplers
- 3/ Service Wrenches (1/4", 3/8")
- 4/ Safety Goggles
- 5/ Leather Gloves
- 6/ Pocket Thermometers (2) 0-20 deg. F.
- 7/ 6" Crescent Wrench
- 8/ 8" Crescent Wrench
- 9/ 12" Crescent Wrench
- 10/ 10" Channel Pliers
- 11/ Open Box End Wrench (3/8", 1/2", 9/16", 5/8", 3/4")
- 12/ Full Allen Wrench Set
- 13/ Respirator Masks
- 14/ Pocket Flashlight
- 15/ Tape Measure (25')
- 16/ Clamp-on Digital Voltmeter
- 17/ Wire Strippers 2 pair (1 small gauges, 1 medium gauges)
- 18/ 2 Control Screwdrivers (flathead)
- 19/ 4" Common Screwdriver (3/16" x 4")
- 20/ 6" Common Screwdriver (1/4" x 6")
- 21/ 4" Phillips Screwdriver #1 & 6" Phillips Screwdriver #2
- 22/ Conduit Bender with 1/2" & 3/4" Heads
- 23/ Needle Nose Pliers
- 24/ Wire Crimpers
- 25/ 9" Torpedo Level
- 26/ Full Nut Driver Set (1/4", 5/16", 3/8", 7/16", 1/2")
- 27/ 8" Lineman Pliers
- 28/ Conduit Bender with (1/2" & 3/4" Heads)
- 29/ 1 Infrared Handheld Temperature Sensor
- 30/ 1 Handheld Humidity Sensor
- 31/ Voltage Proximity Sensor (2) (1 Low Voltage & 1 High Voltage)
- 32/ Laptop Computer with Windows (Any brand will do)
- 33/ Echelon Lonworks Network Card (Either USB or PCMCIA)

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Common Grading Structure

Classroom participation -	10%
Discussion board online -	10%
Homework -	20%
Weekly quizzes -	10%
Assessments during term -	20%
Final Assessment -	15%
Course project -	15%

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Courses Are Hybrid – Common LMS Design Learning Management System - ANGEL

The screenshot displays the ANGEL LMS interface for the course "BUAS 1020 BAS Electrical concepts I SEMESTER MASTER". The browser address bar shows the URL: `gptc.angellearning.com/section/default.asp?id=830_BUAS1020_ALL_V_MASTER_Master`. The course title is prominently displayed at the top. A navigation menu includes links for Course, Calendar, Course Content, Resources, Communicate, Grades, Automate, Manage, and Virtual Campus. The user is identified as Brian Lovell. The main content area features a sidebar with navigation icons (Home, Help, Power, Mail, Profile) and a central panel with sections for Course Mail (View Inbox, Quick Message, Unread Messages), Course Announcements, and Course Information. A voki avatar is visible in the Course Information section. The Windows taskbar at the bottom shows various application icons and the system clock indicating 8:56 AM on 2/20/2013.

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BAS Fundamentals - BUAS 1010

Sample Topics

- Overview of BAS Industry
- BAS industry leaders
- Career pathways in BAS
- Technical skills for BAS technicians
- Soft skills for BAS technicians
- BAS Industry trends
- BAS Architecture

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BAS Electrical Concepts I – BUAS 1020

Sample Topics

- Metric system & units
- Scientific notation
- Voltage / Current / Resistance
- Ohm's Law
- Conductors / Insulators / Semi-conductors
- Series / Parallel / Series-Parallel circuits
- Electrical energy
- Electrical power
- Basic circuit analysis
- Basic BAS circuits

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BAS Electrical Concepts II – BUAS 1030

Sample Topics

- **Electrical symbols & schematics**
- **Pictorial diagrams**
- **Sequences of operation**
- **Relays & contactors**
- **AC sine wave**
- **Reactive circuit components**
- **Electric motor theory**
- **Electric motor types**
- **Motor starters & wiring**
- **Circuit protection**
- **Power distribution**

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BAS Devices – BUAS 1040

Sample Topics

- **BAS suppliers**
- **Temperature sensors & transmitters**
- **Humidity sensors**
- **Relays & contactors**
- **Access control devices**
- **Actuators**
- **Control valves**
- **Control dampers**
- **Enclosures**
- **Flow devices**
- **Gas & specialty sensors**
- **Controllers**

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BAS Network Architecture – BUAS 1050

Sample Topics

- **Types of networks**
- **OSI model**
- **Network media**
- **TCP/IP protocols**
- **Network topologies**
- **Ethernet standards**
- **Network hardware**
- **WANs**
- **Wireless**
- **Network operating systems**

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BAS Advanced Electrical – BUAS 1060

Sample Topics

- Voltage dividers
- Vectors
- Reactance
- Phasors
- Simplification theorems
- RC / RL / RLC circuit analysis
- Oscilloscope fundamentals
- Filter networks
- Microsoft Visio fundamentals
- Shop drawings

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BAS Advanced Electrical – BUAS 2010

Sample Topics

- Psychrometrics
- All-air / All-water / Air & Water systems
- Boiler types & principles
- Chiller types & principles
- Air & Water side components
- Equipment sequences of operation
- Basic control theory
- Control point types
- Application specific controllers
- Automation-level controllers
- Industry standard inputs & outputs
- PID control

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BAS Logic & Programming– BUAS 2020

Sample Topics

- **Number systems**
- **Boolean logic**
- **Truth tables**
- **Logic gates**
- **Digital logic circuits**
- **Object-oriented programming**
- **ALICE introduction**
- **Data types**
- **Conditional statements**
- **Programming style**
- **Modular programming**
- **Java introduction**

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BAS Design & Installation – BUAS 2030

Sample Topics

- **BAS contracting basics**
- **Bid & Spec. vs. Design-Build**
- **Installation tools, fittings, & anchors**
- **Cabling practices**
- **Conduit bending**
- **Commissioning process**
- **Control system design process**
- **Device selection**
- **MS Visio application**
- **Stencil libraries**
- **Shop drawings**
- **Submittal process & development**

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BAS Integration– BUAS 2040

Sample Topics

- **OSI model**
- **Communication packets**
- **Modbus overview**
- **LonWorks protocol**
- **SNVTs / UNVTs / SCPTs / Channels**
- **Function blocks & profiles**
- **BACnet object types**
- **Cross-protocol integration**
- **XML / oBIX / BACnet XML / Niagara AX**

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BAS Internship – BUAS 2050

Field training