

ENGINEERING & MANUFACTURING TECHNOLOGY



ENGINEERING GRAPHICS TECHNOLOGY

ASSOCIATE IN APPLIED SCIENCE

Your Butler experience will prepare you to apply technical skills and advanced computer software and hardware to the creation of graphic representations and simulations in support of architectural and

engineering projects. This program includes instruction in engineering graphics, two-dimensional and three-dimensional design, solid modeling, computer-aided design(CAD) and other CAD applications.

General Education Requirements

Course	Hours
Communications	9
___English Comp I (EG 101)	
___Public Speaking (SP 100)	
___Technical Writing (EG 112)	
Science and Math	8
___Trigonometry (MA 140)	
___Gen. Physics (PH 143)	
Social/Behavioral Science Requirement	3
___Ethics (PL 291)	

Mechanical

Required Courses	Hours
___Two-Dimensional Design (AR 121)	3
___Graphics I (EN 101)	3
___Graphics II (EN 102)	3
___Manufacturing Processes (IT 204)	3
___Engineering Concepts (EN 115)	2
___Special Problems in Drafting & CAD (EN 206)	2
___AutoCAD Basics (EN 107)	3
___AutoCAD Advanced (EN 207)	3
___Networking Basics (IN 134)	3
___Basic CATIA (IT 218)	3
___Advanced CATIA (IT 219)	3
___Intro. to Metrology (IT 263)	3

___Internship I (EN 193) 3

A total of 64 credit hours is required for this degree. In addition to the 20 credit hours of general education requirements and 37 credit hours of required courses, 7 credit hours of related electives are required.

Civil/Structural/Architectural

Required Courses	Hours
___Two-Dimensional Design (AR 121)	3
___Graphics I (EN 101)	3
___Graphics II (EN 102)	3
___Residential Design and CAD I (EN 103)	3
___Introduction to Surveying (EN 104)	3
___Engineering Concepts (EN 115)	2
___3D Modeling & CAD (EN 214)	3
___Commercial Building Design and CAD (EN 211)	3
___Special Problems in Drafting & CAD (EN 206)	2
___Structural, Civil and Pipe Design & CAD (EN 217)	3
___AutoCAD Basics (EN 107)	3
___AutoCAD Advanced (EN 207)	3
___Networking Basics (IN 134)	3
___Internship (EN 193)	3

A total of 64 credit hours is required for this degree. In addition to the 21 credit hours of general education requirements and 41 credit hours of required courses, 2 credit hours of related electives are required.

Related Electives	Hours
___Any Manufacturing Engineering Technology (IT) Course.	3
___Surveying II (EN 204)	3
___Statics (EN 260)	3
___PC Visual Basic Programming (IN 108)	3
___Introduction to Programming (IN 105)	3
___Physical Geology (PS 102)	4
___Special Topics (EN 253/254)	3

Engineering Graphics Technology
 Career Program
 Degree Offered: Associate in Applied Science
 Credits Required: 64
 Contact: Mel Whiteside, Lead Instructor at 316.218.6135 or Becki Foster, Technical Advancement Director, at 316.322.3277

Accreditation
 Currently seeking ABET-TAC accreditation.

Prior to Admission
 Students are required to take the ASSET test. Students must score a minimum of 37 Reading, 35 Writing, and 35 Numerical Math.

Additional Costs
 An additional \$25 lab fee is assessed to each program course and subject to change.

Recommended Course Sequence
 Graphics I/EN 101 is recommended before upper level EN Courses

After Butler
 Recent graduates hold positions as Mechanical Engineering Technicians. After finishing a bachelor's degree, graduates hold positions as aeronautical, electrical, electronic or mechanical engineers, architects, and drafters.

University Articulations
 Students wishing to take advantage of articulations with WSU, KSU-Salina or most universities are advised to complete up through PH 251 Physics I, which requires several Math prerequisites.

High School Articulation Credit
 Prior to enrollment student must submit a drawing portfolio for review by lead instructor and pass a drawing exam. Students must also maintain a 3.0 GPA in all CAD/Drafting courses.

Median Wage for Mechanical Engineering Technicians in South Central Kansas is \$40,706 per year. (Source: Kansas Department of Human Resources Local Area IV, 2003 edition Source: Workforce Planning Guide & Wage Survey, Local Area IV 2003 Edition, KDHR.)

Pre-Engineering - Career Program

Degree Offered: Associate in Science
Credits Required: 62
Contact: Larry Friesen, Lead
Mathematics/Engineering Instructor, at
316.322.3138

Requirements - see Program of Study

Recommended Course Sequence

Semester 1: EG 101, MA 151, CH 110, EN 115, Physical Education Requirement
Semester 2: EG 102, MA 152, EN 101 or CH 115, Semester 3: MA 253, PH 251, SP 100, Humanities Requirement, or Electives Semester 4: MA 260, PH 252, EN 260, Behavioral Science Requirement, Fine Arts Requirement

Recommended Electives

Any IN Programming course; Any IT Integrated Technology course, Graphics I & II, EC200

After Butler

Career opportunities include Aerospace Engineering, Chemical Engineering, Electrical Engineering, Industrial Engineering, Mechanical Engineering, and Nuclear Engineering.

Median Wage for Architectural and Civil Drafters in South Central Kansas is \$34,050 per year. Median Wage for Civil Engineering Technicians is \$34,258 per year. Median Wage for Mechanical Engineering Technicians is \$40,706 per year. (Source: Kansas Department of Human Resources Local Area IV, 2003 edition.)

CAD Technician

Career Program
Certificate in CAD Technician
Credits Required: 31
Contact: Mel Whiteside, Lead Instructor, at 316.218.6135 or Becki Foster, Technical Advancement Director, at 316.322.3277

Accreditation

Currently seeking ABET-TAC accreditation.

Recommended Course Sequence

Graphic I/EN 101 is recommended before upper level EN Courses

Additional Costs

An additional \$25 lab fee is assessed to each program course and subject to change.

After Butler

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Course

Communications

___English Comp I	(EG 101)
___English Comp II	(EG 102)
___Public Speaking	(SP 100)

Science and Math

___Calculus I with Analytic Geometry	(MA 151)
___College Chemistry I	(CH 110)
___Calculus II with Analytic Geometry	(MA 152)

Social/Behavioral Science

___Social Science Requirement
___Behavioral Science Requirement

Humanities/Fine Arts

___Humanities Requirement
___Fine Arts Requirement

Physical Education

___Physical Education Requirement

A minimum of 62 credit hours is required for the Associate in Science degree. In addition to general education requirements, coursework to complete this Associate in Science degree is listed in next column:

PRE-ENGINEERING

ASSOCIATE IN SCIENCE

Hours	Required Courses	Hours
9	___Calculus III with Analytic Geometry (MA 253)	3
	___Differential Equations (MA 260)	3
	___Physics I (PH 251)	5
	___Physics II (PH 252)	5
11	___Graphics I or College Chemistry II (EN 101 or CH 115)	3-5*
	___Engineering Concepts (EN 115)	2
	___Statics (EN 260)	3

Related Electives

3-5

*Students interested in civil, electrical, industrial and mechanical options of pre-engineering need Graphics I. Students interested in chemical, nuclear and petroleum options of pre-engineering should enroll in Chemistry II. Advisement in either course for any option should be verified by future university of choice. Also see "Engineering Graphics Technology."

Program Information

Courses available range from basic math and algebra to calculus, differential equations and statistics. Butler has agreements with the state universities for course transfer.

ENGINEERING GRAPHICS TECHNOLOGY

CERTIFICATE

Your Butler experience will prepare you to apply technical skills and advanced computer software and hardware to the creation of graphic drawings and simulations in support of architectural and engineering projects. This program includes instruction in engineering graphics, two-dimensional and three-dimensional design, solid modeling, computer-aided design (CAD) and other CAD applications.

Prior to Admission

Students are required to take the ASSET test. Students must score a minimum of 37 Reading, 35 Writing, and 35 Numerical Math.

Required Courses

Required Courses	Hours
___Two-Dimensional Design	(AR 121) 3
___Graphics I	(EN 101) 3
___Graphics II	(EN 102) 3
___Residential Design and CAD I	(EN 103) 3

___Engineering Concepts	(EN 115)	2
___Special Problems in Drafting & CAD	(EN 206)	2
___Commercial Building Design and CAD	(EN 211)	3
___Structural, Civil and Pipe Design & CAD	(EN 217)	3
___Math Requirement	(MA 114 or above)	3
___Applied Physics	(PH 109)	3
___Basic CATIA	(IT 218)	3

Certificate requires 31 credit hours.

MANUFACTURING ENGINEERING TECHNOLOGY

ASSOCIATE IN APPLIED SCIENCE

Your Butler experience will prepare you to apply basic engineering principles and technical skills to the identification and resolution of production problems in the manufacture of products. This program provides instruction in machine operations, production line operations, engineering analysis, systems analysis, instrumentation, physical controls, automation, computer-aided manufacturing (CAM), manufacturing planning, quality control, and informational infrastructure.

General Education Requirements

Course Hours

Communications 9

___English Comp I	(EG 101)	
___Public Speaking	(SP 100)	
___One other course	(EG 102, EG 112)	

Science and Math 6

___Math Requirement	(MA 131)	
___Science Requirement	(PH 109 or CH 105 or above CH 105 strongly advised)	

Social/Behavioral Science Requirement 3

___Sociology	(BS 105) or	
___General Psychology	(BS 160)	

Required Courses

Hours

___Machine Processes I	(IT 100)	3
___Machine Processes II	(IT 102)	3
___Beginning Concepts of CNC	(IT 120)	3
___Machine Trades Print Reading	(IT 150)	1
___Manufacturing Processes	(IT 204)	3
___Industrial Safety	(IT 205)	3
___Basic CATIA	(IT 218)	3
___Advanced CATIA	(IT 219)	3
___Adv. Automated Manufacturing with CNC	(IT 220)	3
___Introduction to Material Science	(IT 226)	3
___Manufacturing Science	(IT 227)	3
___Introduction to Quality Assurance	(IT 260)	3
___Introduction to Metrology	(IT 263)	3

A total of 64 hours is required for this degree. In addition to the 18 credit hours of general education requirements and 37 hours of required courses, students must choose 9 credit hours from the list of related electives below:

Related Electives

		Hours
___Graphics I	(EN 101)	3
___Graphics II	(EN 102)	3
___Engineering Concepts	(EN 115)	2
___Industrial Supervision	(IT 141)	3
___Mechanical Devices and Sys	(IT 116)	3
___Fluid Power	(IT 117)	3
___Cooperative Education	(IT 197)	3
___Basic FeatureCAM	(IT 216)	3
___Basic Mastercam	(IT 217)	3
___Advanced FeatureCAM	(IT 221)	3
___Advanced Mastercam	(IT 225)	3

Manufacturing Engineering Technology

Career Program

Degree Offered: Associate in Applied Science in Manufacturing Technology
Credits Required: 64

Contact: Buford Pringle, Lead Instructor, at 316.218.6136 or Becki Foster, Technical Advancement Director, at 316.322.3277

Accreditation

Currently seeking ABET-TAC accreditation.

Prior to Admission

Students are required to take the ASSET test. Students must score a minimum of 37 Reading, 35 Writing, and 35 Numerical Math.

Recommended Course Sequence

Semester 1: IT 100, IT 102, IT 204, IT 120, IT 218

Semester 2: IT 220, IT 141, MA 131,

Semester 3: IT 226, IT 227, IT 228

Semester 4: IT 117, IT 215, IT 205, Advanced Programming Course

University Articulations

Students wishing to take advantage of articulations with WSU, KSU-Salina or most universities are advised to complete up through PH 251 Physics I, which requires several Math prerequisites.

Additional Costs

Courses with labs have a \$50 lab fee and are subject to change.

After Butler

Recent graduates hold positions in manufacturing, machining, CNC (Computer Numerical Control) operation.

Median Wage for Computer-Controlled Machine Tool Operators in South Central Kansas is \$37,523 per year. Median Wage for Numerical Tool and Process Control Programmers in South Central Kansas is \$44,357 per year. Median Wage for a Manufacturing Technologist in South Central Kansas is \$42,220 per year. (Source: Workforce Planning Guide & Wage Survey, Local Area IV 2003 Edition, KDHR.)

Manufacturing Engineering Technology

Career Program

Certificate in Manufacturing Technology and eligibility to take the Society of Manufacturing Engineers (SME)

certification test

Credits Required: 37

Contact: Buford Pringle, Lead Instructor, at 316.218.6136 or Becki Foster, Technical Advancement Director, at 316.322.3277

Accreditation

Currently seeking ABET-TAC accreditation.

Prior to Admissions

Students are required to take the ASSET test. Students must score a minimum of 37 Reading, 35 Writing, and 35 Numerical Math.

Recommended Course Sequence

Semester 1:

IT 100, IT 102, IT 204, IT 120, IT 205

Semester 2:

IT 220, IT 141, EN 101, MA 131,

Semester 3:

IT 226, IT 227, IT 228

Semester 4:

IT 117, IT 215, Advance Programming

Additional Costs

Courses with labs have a \$50 lab fee and are subject to change.

After Butler

Recent graduates hold positions in manufacturing, machining and CNC (Computer Numerical Control) operation

Median Wage for Computer-Controlled Machine Tool Operators in South Central Kansas is \$37,523 per year. Median Wage for Numerical Tool and Process Control Programmers in South Central Kansas is \$44,357 per year. (Source: Workforce Planning Guide & Wage Survey, Local Area IV 2003 Edition, KDHR.)

MANUFACTURING ENGINEERING TECHNOLOGY

CERTIFICATE

Your Butler experience will prepare you to apply basic engineering principles and technical skills to the identification and resolution of production problems in the manufacture of products. This program provides instruction in machine operations, production line operations, engineering analysis, systems analysis, instrumentation, physical controls, automation, computer-aided manufacturing (CAM), manufacturing planning, quality control, and informational infrastructure.

Prior to Admission

Students are required to take the ASSET test. Students must score a minimum of 37 Reading, 35 Writing, and 35 Numerical Math.

Required Courses

		Hours
___Machine Processes I	(IT 100)	3
___Machine Processes II	(IT 102)	3
___Beginning Concepts of CNC	(IT 120)	3
___Machine Trades Print Reading	(IT 150)	1
___Manufacturing Processes	(IT 204)	3
___Advanced CATIA	(IT 219)	3
___Introduction to Quality Assurance	(IT 260)	3
___Introduction to Metrology	(IT 263)	3

___Industrial Safety	(IT 205)	3
___Basic CATIA	(IT 218)	3
___Adv. Automated Manufacturing with CNC	(IT 220)	3
___Intro to Material Science	(IT 226) or	3
___Manufacturing Science	(IT 227)	3

Students must have 6 hours of related electives from the following:

Related Electives		Hours
___Graphics I	(EN 101)	3
___Graphics II	(EN 102)	3
___Mechanical Devices and Systems	(IT 116)	3
___Fluid Power	(IT 117)	3
___Geo. Dimensioning & Tolerancing	(IT 212)	3
___Basic FeatureCAM	(IT 216)	3
___Basic Mastercam	(IT 217)	3
___Advanced FeatureCAM	(IT 221)	3
___Advanced Mastercam	(IT 225)	3

Certificate requires 37 credit hours.

WELDING TECHNOLOGY

ASSOCIATE IN APPLIED SCIENCE

Your Butler experience will prepare you to apply technical knowledge and skills to join or cut metal surfaces. Includes instruction in various welding and cutting processes, blueprint reading, and metallurgy, all as applied to both ferrous and non-ferrous metals.

General Education Requirements

Course	Hours
Communications	6
___English Comp I (EG 101)	
___Public Speaking (SP 100)	
Science, Math and Computer Science	9
___Math Requirement (MA 114 or above)	
___Science Requirement (PH 109 or CH 105 or above)	
___Computer Science Requirement	
Social/Behavioral Science Requirement	3
___Sociology (BS 105) or	
___General Psychology (BS 160)	

Required Courses

	Hours
Fall	
___OxyFuel Gas Welding (WE 112)	2
___Cutting Operations (WE 113)	2
___Welding Methods (WE 114)	2
___Shielded Arc Welding (WE 116)	3
___Blueprint Reading Welding (WE 119)	3
___Fundamentals of Welding I (WE 121)	3
___Gas Tungsten Arc Welding (WE 215)	3
Spring	
___Welding Survey (WE 111)	3
___Fundamentals of Welding II (WE 122)	3
___Automatic Arc & Inert Gas welding (WE 212)	2
___Welding and Pipefitting (WE 213)	2
___Welding Problems (WE 216)	2
___Gas Metal Arc Welding (WE 219)	2
___Metallurgy (WE 220)	3

A total of 62 credit hours is required for this degree. In addition to the 18 credit hours of general education requirements and 35 credit hours of required courses, you must choose 9 credit hours from the list of related electives below:

Related Electives	Hours
___Intro to Business (BA 110)	3
___Personal Finance (BA 112)	3
___Business Law I (BA 115)	3
___Accounting I (BA 126)	3
___Personal Selling (BA 215)	3
___Principles of Management (BA 210)	3
___Industrial Supervision (IT 141)	3
___Industrial Safety (IT 205)	3
___Cooperative Education I, II, III, IV (WE 197, 198, 297, 298)	2-5

Welding Technology

Career Program
Degree Offered: Associate in Applied Science
Credits Required: 62
Contact: Matt Galbraith, Lead Instructor, at 316.323.6824 or Becki Foster, Technical Advancement Director, at 316.322.3277

Recommendations

These classes are in high demand and fill quickly. Enrollment is limited.

Accreditation

All Instructors are AWS Certified Welding educators.

Additional Costs/Tool Requirement

An additional \$25 lab fee is assessed to each program course and subject to change.

Prior to Admission

Students are required to take the ASSET test. Students must score a minimum of 37 Reading, 35 Writing, and 35 Numerical Math.

Recommended Course Sequence

Semester 1:
WE 121, WE 112, WE 116, WE 113, WE 114, WE 111, WE 215
Semester 2:
WE 122, WE 220, WE 119, WE 219, WE 216, WE 212, WE 213
Semester 3:
General Education Classes
Semester 4:
General Education Classes

After Butler

Recent graduates hold positions as welders, welding inspectors or supervisors, and welding sales representatives.

Median Wage for Welders, Cutters, Solderers, and Brazers in South Central Kansas is \$30,905 per year. (Source: Workforce Planning Guide & Wage Survey, Local Area IV 2003 Edition, KDHR.)

Welding Technology

Career Program
Certificate in Welding Technology
Credits Required: 35
Contact: Matt Galbraith, Lead Instructor, at 316.323.6824 or Becki Foster, Technical Advancement Director, at 316.322.3277

Recommendations

These classes are in high demand and fill quickly. Enrollment is limited.

Accreditation

All Instructors are AWS Certified Welding educators.

Additional Costs/Tool Requirement

An additional \$25 lab fee is assessed to each program course and subject to change.

Prior to Admission

Students are required to take the ASSET test. Students must score a minimum of 37 Reading, 35 Writing, and 35 Numerical Math.

Recommended Course Sequence

Semester 1: WE 121, WE 112, WE 116, WE 113, WE 114, WE 111, WE 215 Semester 2: WE 122, WE 220, WE 119, WE 219, WE 216, WE 212, WE 213

After Butler

Recent graduates hold positions as welders, welding inspectors or supervisors, and welding sales representatives

Median Wage for Welders, Cutters, Solderers, and Brazers in South Central Kansas is \$30,905 per year. (Source: Workforce Planning Guide & Wage Survey, Local Area IV 2003 Edition, KDHR.)

WELDING TECHNOLOGY

CERTIFICATE

Your Butler experience will prepare you to apply technical knowledge and skills to join or cut metal surfaces. Includes instruction in various welding and cutting processes, blueprint reading, and metallurgy, all as applied to both ferrous and non-ferrous metals.

Prior to Admission

Students are required to take the Asset test. Students must score a minimum of 37 Reading, 35 Writing, and 35 Numerical Math.

Required Courses

	Hours
Fall	
___OxyFuel Gas Welding (WE 112)	2
___Cutting Operations (WE 113)	2
___Welding Methods (WE 114)	2
___Shielded Arc Welding (WE 116)	3
___Blueprint Reading (Welding) (WE 119)	3
___Fundamentals of Welding I (WE 121)	3
___Gas Tungsten Arc Welding (WE 215)	3

Spring

___Welding Survey (WE 111)	3
___Fundamentals of Welding II (WE 122)	3
___Automatic Arc & Inert Gas Welding (WE 212)	2
___Welding and Pipefitting (WE 213)	2
___Welding Problems (WE 216)	2
___Gas Metal Arc Welding (MIG) (WE 219)	2
___Metallurgy (WE 220)	3

Certificate requires 35 credit hours.