

End of Course
(EOC) Bank
Blueprints

Engineering and Design

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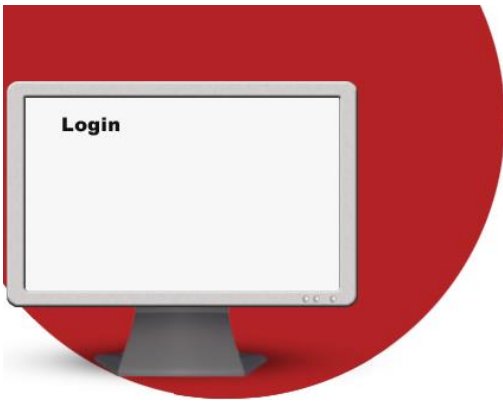
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About Test Blueprints

Test blueprints are created to provide guidance to Subject Matter Experts (SMEs) during the item writing phase of test development. In addition, we believe that they can assist those instructors who did not participate in item writing (and administrators) to understand the broad content of the item bank. Items are formally allocated across a course outline in a three-step process*:

1. CETE psychometricians use a formula which assumes that all competencies within a course outline are *essential* and of equal importance to produce a suggested test blueprint for review by Ohio Department of Education program specialists and SMEs.
2. SMEs review the blueprint as a large group before item writing for a specific EOC test. There and in small groups, SMEs review the course outline and have the ability to make changes to the blueprint with a documented rationale based on their experience and expertise.
3. Any revisions during small group work must be approved by the larger panel of SMEs attending an item writing workshop, which is the last step and produces the final blueprint which is summarized in this document.



Test blueprints can provide high-level guidance to instructors on preparing students for testing. It is important to keep in mind that the blueprint is a tool that is used when developing the test item bank during initial item writing and test creation. As with all tests, the End-of-Course test forms are a sample of the item bank.

Interpreting the Blueprints

Test blueprints display the total number of test items SMEs planned to write to a particular *outcome* (as designated in the course outline created by the Ohio Department of Education Office of Career-Technical Education or by a vendor). Blueprints describe the structure of the item bank which is the total pool of test items created. Final test forms of 40-items are created from the item bank.

*This newer process for producing test blueprints was implemented October 1, 2015. Item banks created prior to this date were completed under a different blueprint process and therefore we are looking backward to provide the structure of the item bank. As revisions are completed for those career fields, for example Information Technology (2017-18), the blueprint process used will be the newer model.

Learn more at cete.osu.edu/expertise/assessment

Engineering Principles

ODE Subject Code: 175002

Outcome #	Outcome Name	% Items Approved by SMEs
Strand 1. Business Operations/21st Century Skills		
1.1.	Employability Skills	4.40
1.2.	Leadership and Communications	5.49
1.3.	Business Ethics and Law	2.20
1.4.	Knowledge Management and Information Technology	2.20
1.5.	Global Environment	2.20
1.6.	Business Literacy	2.20
1.9.	Financial Management	2.20
Strand 2. Electrical/Electronics		
2.1.	Electronic Theory	7.69
2.2.	Circuits	10.99
2.3.	Codes and Regulations	2.20
2.4.	Electronic Components	5.49
Strand 3. Computer Integrated Manufacturing		
3.4.	Power Technologies	6.59
Strand 5. Pre-Engineering: Design and Development		
5.1.	The Design Process	10.99
5.2.	Sketching and Visualization	7.69
5.3.	Computer-Aided Modeling	10.99
5.4.	Computer-Aided Drafting	7.69
5.6.	Production and Process Design	8.79



Manufacturing Operations

ODE Subject Code: 175003

Outcome #	Outcome Name	% Items Approved by SMEs
Strand 1. Business Operations/21st Century Skills		
1.1.	Employability Skills	2.20
1.2.	Leadership and Communications	1.10
1.4.	Knowledge Management and Information Technology	1.10
1.5.	Global Environment	3.30
1.6.	Business Literacy	3.30
1.9.	Financial Management	4.40
Strand 2. Electrical/Electronics		
2.1.	Electronic Theory	2.20
2.2.	Circuits	2.20
2.3.	Codes and Regulations	3.30
2.8.	Power Supplies	6.59
Strand 3. Computer Integrated Manufacturing		
3.4.	Power Technologies	10.99
3.5.	Pumping Systems	3.30
3.6.	Transmission Systems	2.20
Strand 5. Pre-Engineering: Design and Development		
5.2.	Sketching and Visualization	9.89
5.5.	Materials	5.49
5.6.	Production and Process Design	3.30
Strand 6. Precision Machining		
6.1.	Measurement and Interpretation	5.49
6.2.	Layout and Planning	6.59
6.8.	Maintenance	5.49
Strand 7. Safety, Tools and Equipment		
7.1.	Site Safety	12.09
7.2.	Personal Safety	5.49



Robotics

ODE Subject Code: 175004

Outcome #	Outcome Name	% Items Approved by SMEs
Strand 1. Business Operations/21st Century Skills		
1.1.	Employability Skills	1.18
1.2.	Leadership and Communications	1.18
1.3.	Business Ethics and Law	1.18
1.4.	Knowledge Management and Information Technology	1.18
1.5.	Global Environment	1.18
1.6.	Business Literacy	1.18
1.9.	Financial Management	1.18
Strand 2. Electrical/Electronics		
2.1.	Electronic Theory	16.47
2.2.	Circuits	3.53
2.3.	Codes and Regulations	1.18
2.6.	Digital Electronics	4.71
2.7.	Cabling and Wiring	7.06
2.8.	Power Supplies	3.53
2.9.	Motors and Power	1.18
Strand 3. Computer Integrated Manufacturing		
3.2.	Robotics	32.94
3.3.	Programmable Logic Controllers (PLCs)	21.18



Computer Integrated Manufacturing

ODE Subject Code: 175006

Outcome #	Outcome Name	% Items Approved by SMEs
Strand 2. Electrical/Electronics		
2.8.	Power Supplies	2.53
2.9.	Motors and Power	7.59
Strand 3. Computer Integrated Manufacturing		
3.1.	Computer Numerical Control (CNC)	21.52
3.2.	Robotics	2.53
3.3.	Programmable Logic Controllers (PLCs)	2.53
Strand 5. Pre-Engineering: Design and Development		
5.1.	The Design Process	5.06
5.2.	Sketching and Visualization	8.86
5.3.	Computer-Aided Modeling	5.06
5.5.	Materials	13.92
5.6.	Production and Process Design	7.59
Strand 6. Precision Machining		
6.1.	Measurement and Interpretation	3.80
6.2.	Layout and Planning	6.33
6.5.	Turning	6.33
6.6.	Milling	3.80
6.8.	Maintenance	2.53



Digital Electronics

ODE Subject Code: 175007

Outcome #	Outcome Name	% Items Approved by SMEs
Strand 1. Business Operations/21st Century Skills		
1.1.	Employability Skills	6.52
1.2.	Leadership and Communications	2.17
1.3.	Business Ethics and Law	2.17
1.4.	Knowledge Management and Information Technology	1.09
1.5.	Global Environment	1.09
1.6.	Business Literacy	1.09
1.9.	Financial Management	1.09
Strand 2. Electrical/Electronics		
2.1.	Electronic Theory	13.04
2.2.	Circuits	9.78
2.3.	Codes and Regulations	2.17
2.4.	Electronic Components	9.78
2.5.	Electronic Soldering Connections	6.52
2.6.	Digital Electronics	39.13
Strand 5. Pre-Engineering: Design and Development		
5.2.	Sketching and Visualization	4.35



Mechanisms and Drives

ODE Subject Code: 175008

Outcome #	Outcome Name	% Items Approved by SMEs
Strand 1. Business Operations/21st Century Skills		
1.1.	Employability Skills	3.61
1.2.	Leadership and Communications	4.82
1.3.	Business Ethics and Law	4.82
1.6.	Business Literacy	3.61
1.9.	Financial Management	6.02
Strand 2. Electrical/Electronics		
2.1.	Electronic Theory	16.87
2.8.	Power Supplies	2.41
2.9.	Motors and Power	15.66
Strand 3. Computer Integrated Manufacturing		
3.5.	Pumping Systems	8.43
3.6.	Transmission Systems	33.73



DC and AC Electronic Circuits

ODE Subject Code: 175011

Outcome #	Outcome Name	% Items Approved by SMEs
Strand 1. Business Operations/21st Century Skills		
1.1.	Employability Skills	2.88
1.2.	Leadership and Communications	0.96
1.3.	Business Ethics and Law	0.96
1.4.	Knowledge Management and Information Technology	2.88
1.9.	Financial Management	0.96
Strand 2. Electrical/Electronics		
2.1.	Electronic Theory	32.69
2.2.	Circuits	24.04
2.3.	Codes and Regulations	4.81
2.4.	Electronic Components	16.35
Strand 5. Pre-Engineering: Design and Development		
5.5.	Materials	3.85
Strand 6. Precision Machining		
6.1.	Measurement and Interpretation	2.88
Strand 7. Safety, Tools and Equipment		
7.1.	Site Safety	2.88
7.2.	Personal Safety	3.85



Analog Based Electronic Devices

ODE Subject Code: 175012

Outcome #	Outcome Name	% Items Approved by SMEs
Strand 1. Business Operations/21st Century Skills		
1.1.	Employability Skills	4.21
1.3.	Business Ethics and Law	4.21
1.9.	Financial Management	4.21
Strand 2. Electrical/Electronics		
2.4.	Electronic Components	44.21
2.5.	Electronic Soldering Connections	9.47
2.8.	Power Supplies	17.89
Strand 5. Pre-Engineering: Design and Development		
5.5.	Materials	2.11
Strand 6. Precision Machining		
6.1.	Measurement and Interpretation	7.37
Strand 7. Safety, Tools and Equipment		
7.1.	Site Safety	3.16
7.2.	Personal Safety	3.16



Engineering Logic

ODE Subject Code: 175017

Outcome #	Outcome Name	% Items Approved by SMEs
Strand 1. Business Operations/21st Century Skills		
1.1.	Employability Skills	4.35
1.2.	Leadership and Communications	2.17
1.3.	Business Ethics and Law	3.26
1.4.	Knowledge Management and Information Technology	1.09
1.5.	Global Environment	3.26
1.6.	Business Literacy	3.26
1.9.	Financial Management	3.26
Strand 2. Electrical/Electronics		
2.1.	Electronic Theory	11.96
2.2.	Circuits	13.04
2.4.	Electronic Components	7.61
2.5.	Electronic Soldering Connections	8.70
2.6.	Digital Electronics	38.04



Machine Tools

ODE Subject Code: 176004

Outcome #	Outcome Name	% Items Approved by SMEs
Strand 6. Precision Machining		
6.1.	Measurement and Interpretation	17.65
6.2.	Layout and Planning	28.24
6.3.	Cutting	14.12
6.4.	Drilling	11.76
6.7.	Grinding	10.59
6.8.	Maintenance	17.65



Welding Technologies

ODE Subject Code: 176009

Outcome #	Outcome Name	% Items Approved by SMEs
Strand 1. Business Operations/21st Century Skills		
1.1.	Employability Skills	9.89
1.2.	Leadership and Communications	6.59
1.3.	Business Ethics and Law	4.40
Strand 4. Materials Joining		
4.1.	Physics of Welding	13.19
4.2.	Metallurgy of Welding 6 0	3.30
4.3.	Arc Welding Processes	6.59
4.4.	Non-Arc Welding	2.20
4.5.	Testing and Inspection	4.40
4.6.	Thermal Cutting	6.59
Strand 6. Precision Machining		
6.1.	Measurement and Interpretation	6.59
6.2.	Layout and Planning	4.40
6.3.	Cutting	6.59
6.8.	Maintenance	5.49
Strand 7. Safety, Tools and Equipment		
7.1.	Site Safety	8.79
7.2.	Personal Safety	10.99



Principles of Manufacturing

ODE Subject Code: 176010

Outcome #	Outcome Name	% Items Approved by SMEs
Strand 1. Business Operations/21st Century Skills		
1.1.	Employability Skills	4.21
1.2.	Leadership and Communications	3.16
1.3.	Business Ethics and Law	3.16
1.4.	Knowledge Management and Information Technology	3.16
1.5.	Global Environment	3.16
1.6.	Business Literacy	3.16
1.9.	Financial Management	3.16
Strand 3. Computer Integrated Manufacturing		
3.1.	Power Technologies	15.79
Strand 5. Pre-Engineering: Design and Development		
5.1.	The Design Process	12.63
5.2.	Sketching and Visualization	11.58
5.3.	Computer-Aided Modeling	12.63
5.6.	Production and Process Design	11.58
Strand 6. Precision Machining		
6.2.	Layout and Planning	12.63



Plan Reading
ODE Subject Code: 178019

Outcome #	Outcome Name	% Items Approved by SMEs
Strand 3. Structural Construction		
3.2.	Site Management	9.52
Strand 6. Planning and Design		
6.1.	Proposals	20.24
6.4.	Construction Drawings	45.24
6.5.	Construction Math	25.00



Architecture Design- Structural and Mechanical/Electrical/Plumbing

ODE Subject Code: 178020

Outcome #	Outcome Name	% Items Approved by SMEs
Strand 1. Business Operations/21st Century Skills		
1.4.	Knowledge Management and Information Technology	18.60
Strand 6. Planning and Design		
6.1.	Proposals	16.28
6.3.	Drafting	23.26
6.4.	Construction Drawings	27.91
6.5.	Construction Math	13.95



Architecture Design - Site and Foundation Plans

ODE Subject Code: 178021

Outcome #	Outcome Name	% Items Approved by SMEs
Strand 1. Business Operations/21st Century Skills		
1.4.	Knowledge Management and Information Technology	18.60
Strand 6. Planning and Design		
6.1.	Proposals	16.28
6.3.	Drafting	23.26
6.4.	Construction Drawings	27.91
6.5.	Construction Math	13.95



Energy Systems Management

ODE Subject Code: 010715

Outcome #	Outcome Name	% Items Approved by SMEs
Strand 1. Business Operations/21st Century Skills		
1.1.	Employability Skills	6.67
1.2.	Leadership and Communications	6.67
1.3.	Business Ethics and Law	1.33
1.4.	Knowledge Management and Information Technology	2.67
1.6.	Business Literacy	2.67
1.10.	Sales and Marketing	1.33
1.11.	Principles of Business Economics	4.00
1.12.	Site and Personal Safety Procedures	8.00
Strand 3. Biotechnology		
3.8.	Research and Experiments	1.33
Strand 4. Power Systems		
4.1.	Tool, Stationary and Mobile Equipment Maintenance	9.33
4.2.	Equipment Operations	4.00
Strand 5. Structural Engineering		
5.1.	Electrical Theory	10.67
5.2.	Structural Electrical Circuits	6.67
5.3.	Design and Estimate	8.00
5.4.	Surveying and Mapping	4.00
5.8.	Water Distribution Systems	6.67
Strand 6. Environmental Science		
6.10.	Ecosystems	2.67
Strand 9. Energy		
9.1.	Energy Source	12.00
9.2.	Crude Oil and Natural Gas	4.00
9.3.	Biomass	5.33
9.4.	Solar Energy	5.33
9.5.	Wind Energy	8.00



Computer Hardware

ODE Subject Code: 145025

Outcome #	Outcome Name	% Items Approved by SMEs
Strand 2. IT Fundamentals		
2.1.	Describe the need for security and explain security risks and security safeguards	16.77
2.2.	Apply networking fundamentals to infrastructure systems	9.94
2.4.	Identify trending technologies, their fundamental architecture, and their value in the marketplace	3.11
2.6.	Install and configure hardware and software	9.94
2.10.	Select, operate, and maintain equipment	13.66
2.11.	Select and apply troubleshooting methodologies for problem solving	9.94
2.12.	Develop performance tests and acceptance plans	5.59
2.13.	Plan rollout and facilitate handoff to customer	6.83
Strand 3. Information Security		
3.5.	Implement secure wireless networks	6.83
Strand 4. Infrastructure Systems		
4.3.	Select, assemble, terminate, and test media.	9.94
4.13.	Recommend disaster recovery and business continuity plans.	7.45

Computer Software

ODE Subject Code: 145030

Outcome #	Outcome Name	% Items Approved by SMEs
Strand 1. Business Operations/21st Century Skills		
1.6.	Business Literacy	0.66
Strand 2. IT Fundamentals		
2.1.	Describe the need for security and explain security risks and security safeguards	13.82
2.2.	Apply networking fundamentals to infrastructure systems	3.29
2.4.	Identify trending technologies, their fundamental architecture, and their value in the marketplace	5.92
2.5.	Maintain operating systems	12.50
2.6.	Install and configure hardware and software	10.53
2.10.	Select, operate, and maintain equipment	5.92
2.11.	Select and apply troubleshooting methodologies for problem solving	9.21
2.12.	Develop performance tests and acceptance plans	3.95
2.13.	Plan rollout and facilitate handoff to customer	4.61
Strand 3. Information Security		
3.1.	Describe the components associated with information security systems	5.92
3.2.	Implement and maintain general security compliance	5.92
3.4.	Explain information technology mechanisms as they apply to a multilayer defense structure	3.95
3.5.	Implement secure wireless networks.	5.92
Strand 4. Infrastructure Systems		
4.3.	Select, assemble, terminate, and test media.	3.29
4.13.	Recommend disaster recovery and business continuity plans.	4.61



Aviation

ODE Subject Code: 177013

Outcome #	Outcome Name	% Items Approved by SMEs
Strand 1. Business Operations/21st Century Skills		
1.1.	Employability Skills	1.33
1.2.	Leadership and Communications	1.33
1.3.	Business Ethics and Law	4.00
1.5.	Global Environment	4.00
Strand 2. Safety, Tools, and Maintenance		
2.2.	Personal Safety	8.00
Strand 7. Aviation and Aeronautics		
7.1.	Aviation	25.33
7.3.	Drawings	6.67
7.6.	Mathematics and Physical Principles	2.67
7.7.	Power Plant	10.67
7.8.	Airport Environments	16.00
7.10.	Meteorology	8.00
7.12.	Aerodynamics	12.00



Biomedical Engineering

ODE Subject Code: 072115

Outcome #	Outcome Name	% Items Approved by SMEs
Strand 5. Bioscience Research and Development		
5.6.	Culturing	65.48
5.7.	Bioreactor Technologies	17.86
5.8.	Biotechnology Research and Experiments	16.67



Hydraulics and Pneumatics

ODE Subject Code: 010225

Outcome #	Outcome Name	% Items Approved by SMEs
Strand 1. Business Operations/21st Century Skills		
1.1.	Employability Skills	3.42
1.2.	Leadership and Communications	3.42
1.3.	Business Ethics and Law	3.42
1.4.	Knowledge Management and Information Technology	2.56
1.6.	Operations Management	1.71
1.8.	Operations Management	1.71
1.10.	Sales and Marketing	1.71
1.12.	Site and Personal Safety Procedures	17.09
Strand 4. Power Systems		
4.1.	Tool, Stationary and Mobile Equipment Maintenance	9.40
4.2.	Equipment Operations	1.71
4.11.	Hydraulic Systems	47.01
4.12.	Brakes	3.42
Strand 6. Environmental Science		
6.8.	Contaminants and Pollution Control	1.71
6.9.	Hazardous Materials and Waste Management	1.71

