DRAFT CHANGES TO
SUBJECT MATTER KNOWLEDGE REQUIREMENTS
FOR EDUCATOR LICENSURE

PUBLIC COMMENT: WWW.SURVEYGIZMO.COM/S3/3620828/DRAFT-PUBLIC-COMMENT-SMK-UPDATES

Subject matter knowledge requirements (SMKs) outline the minimum level of content and pedagogical skills Massachusetts educators are expected to hold. SMKs establish the content assessed in Massachusetts Tests for Educator Licensure (MTEL) and guide content-area coursework for educator preparation programs. SMKs are aligned to Massachusetts curriculum frameworks.

Massachusetts regulation 603 CMR 7.06 requires a public comment period of at least thirty days prior to any changes to the guidelines where SMKs are published. More information on the 2017 proposed changes is available at www.doe.mass.edu/edprep.

TECHNOLOGY/ENGINEERING

CURRENT SUBJECT MATTER KNOWLEDGE REQUIREMENTS 2011-2016

TECHNOLOGY/ENGINEERING, LEVELS 5-12

(a) Nature of engineering and technology systems.
(b) Engineering concepts in specific fields: manufacturing, construction, communication, power, energy, and transportation technologies.
(c) Engineering design and technology development process.
(d) How to use tools, machinery, and materials properly and safely. (e) Environmental effects of engineering/technology.
(f) Skill in technical reading and writing.
(g) Requisite topics in mathematics and physical sciences.

DRAFT CHANGES TO SUBJECT MATTER KNOWLEDGE REQUIREMENTS 2017

TECHNOLOGY/ENGINEERING, LEVEL 5-12

The following topics will be addressed on a subject matter knowledge test:

(a) Understanding of Engineering Design
1. Global challenges and/or design problems that can be improved.
2. Qualitative and quantitative criteria for designing a solution.
3. Use of scientific and engineering principles to break a complex real world problem into smaller, more manageable problems.
4. Solutions to complex and real world problems based on prioritized criteria and trade-offs that account for a range of constraints, as well as social, cultural, and environmental impacts.
5. Prototypes or design solutions that use drawings with proper scale and proportions.

(b) Understanding of Materials, Tools, and Manufacturing
1. Manufacturing processes and applications to create products with desired shape, size, and finish based on available resources and safety.
2. How computers and robots can be utilized in a manufacturing system to differentiate the tasks that are best suited for humans and/or robots.

3. Comparison of the costs and benefits of custom versus mass production of products.
4. How manufacturing processes transform material properties to meet specified purpose or function.

(c) Understanding of Technological Systems

1. The function of a communication system and the role of its components, including a source, encoder, transmitter, receiver, decoder, and storage.
2. Transportation systems designed to move people and goods using a variety of vehicles and devices and subsystems of a transportation vehicle, including structural, propulsion, guidance, suspension, and control subsystems.
3. Use of the concept of systems engineering to model inputs, processes, outputs, and feedback among components of a transportation, structural, or communication system.
4. Use of a model to explain how information transmitted via digital and analog signals travels through the following media: electrical wire, optical fiber, air, and space.

(d) Understanding of Energy and Power Technologies

1. Use of a model to explain differences between open and closed fluid systems.
2. Differences and similarities between hydraulic and pneumatic systems.
3. Ways that energy and power systems harness resources to accomplish tasks effectively and efficiently.
4. How a machine converts energy, through mechanical means, to do work