Using Technology Education Courses as the Third Unit of Math or Science under the Revised Graduation Requirements

(Starting with ninth graders in 2001)

Criteria and Recommendations

In March of 1998, a committee comprised of math, science and technology stakeholders met with State Education Department personnel to discuss criteria for a course that could be used in the third unit of math or science under the revised graduation requirements. The criteria focuses on the integrative nature of the three disciplines and identifies unique elements to form the basis for a course in this option. This option was incorporated into regulation.

Commissioners Regulations 100.5(j) The State learning standards in technology may be met either through a course in technology education or through an integrated course combining technology with mathematics and/or science. A commencement level course in technology education may be used as the third unit of credit in science or mathematics but not both.

Criteria for Using a Technology Education Course in this Option

- Addresses one or more of the key ideas from Standard #5 (Engineering Design; Tools, Resources, and Technological Processes; Computer Technology; Technological Systems; History and Evolution of Technology; Impacts of Technology; Management of Technology) of the MST standards.
- Curriculum must be based on the high school (commencement) level of the MST learning standards adopted by the Board of Regents.
- Courses that deal with specific skill development focused towards employment or are computer centered are not recommended. Courses that use computers as tools for increased productivity or knowledge building would be acceptable.
- The instructor must be certified in the subject; and instructional time must equal at least three hours per week for a year (or the equivalent) for a one-year course.

Instructional Considerations

- Hands-on problem-based activities
- Uses system approach requiring data analysis, mathematical modeling and applies scientific principles and laws of nature.
- Instructional strategies should include design and problem solving, case studies, experimentation, extended tasks.

- Courses should extend in depth and/ or breadth the students understanding required for the math and/or science State assessments.
- Assessment is based on performance with schools maintaining records of student work completed in the course. Students would be required to pass course and locally administered examinations in order to demonstrate achievement of the State standards.
- Courses that meet the criteria should be approved by the local board of education. They do not require a variance from the Education Department. The Education Department will develop a list of examples of courses used by districts that meet the criteria but will not

recommend specific courses to be taught. **Examples of existing courses that meet the criteria are:**

> **Principles of Engineering: A MST Approach to Technology Education** is a course developed around the State standards for Math, Science, and Technology, which could be used. Using a case study approach students are posed open-ended engineering problems that cover a wide range of content. Major concepts are introduced at the beginning of the course and reinforced through the case studies. (State-developed syllabus)
>
> **World of Technology**
> This course is designed to provide students with a commencement level introduction to technology. Learning experiences designed for the course emphasize problem solving and critical thinking utilizing acquired math and science skills in a technology context and real world application.
> (NYSTEA developed course)

For many existing technology education courses, usability would depend on the level of math and science it includes. For example:

A course such as **Residential Structures** places emphasis on building processes and techniques involved in this specific construction area.

Adapting this course would require:

- Increased emphasis on underlying math and science principles appropriate to this technology area
- Less emphasis on construction skills
- Increased focus on geometry, material science and environmental impacts
- More emphasis on transferable skill development
- Experiences that build on the students previous knowledge in math and science

Integrated MST Course in this Option

Integrated courses are identified for this option as courses that take unique aspects or content from math, science and technology areas and provide a context (MST course) for students to do in depth investigations. For mathematics this would incorporate mathematical analysis and reasoning. Science would require scientific inquiry be practiced. For technology education these unique aspects are defined as designing, constructing, using, and evaluating products and services to satisfy human and environmental needs. In an ideal situation this methodology requires a district to provide increased time and facilitate a team teaching approach to gain full value for students. Teachers should be certified in one or more of the areas. MST integration is more then a logistical arrangement of time and personnel. It involves a commitment to professional development and forms of assessment not currently practiced statewide. The State is continuing to research the performance assessment aspects of these integrated courses to help school districts document student understanding of the process and performance aspects of the MST Learning Standards.