Wisconsin Youth Apprenticeship

Science, Technology, Engineering, & Math (STEM)

PROGRAM GUIDE

Investing in Wisconsin's Future

Department of Workforce Development

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Science, Technology, Engineering, & Math (STEM)
YOUTH APPRENTICESHIP
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Description

The Science, Technology, Engineering, & Math (STEM) cluster provides thousands of career opportunities for learners with an interest in math, science, and problem-solving. Students who pursue one of these careers will be involved in planning, managing, and providing valuable scientific research and technical services. Job possibilities abound, even in economic downturns, as more scientists and engineers are called upon to create solutions for problems ranging from the environmental to the economic, the aeronautical to the zoological[1].

Employment of scientists is projected to grow about as fast as the average for all occupations. Opportunities will differ by specialty; however, biologic scientists are expected to increase faster than the average. Growing numbers of agricultural and medicinal products from biotechnology research will drive this demand. Employment will be best for those workers well trained on equipment used in laboratories or production facilities[2].

The outlook in engineering is the same with opportunities varying by specialty. Biomedical engineers should experience the fastest growth, while civil engineers should see the largest employment increase spurred by population growth and related infrastructure demands[2].

This Youth Apprenticeship occupational area focuses on both pathways within the Science, Technology, Engineering, & Math (STEM) industry: Engineering & Technology and Science & Math. In the Engineering and Technology pathway, students study and apply principles of science and math to solve problems in engineering projects involving design, development or production in various technologies. Careers in the Science and Math pathway apply essential math and science content in a real-world application to increase knowledge in physical, environmental and human endeavors[1].

The Youth Apprenticeship Program was approved by the Wisconsin State legislature in 1991 to provide a direct link between business, schools, and youth to meet the demands of technology, teamwork, communication, and leadership.

[1] STEM Career Cluster Brochure, www.careercluster.org, October 2008.
[2] Department of Labor, Occupational Outlook Handbook, 2010-11.

Wisconsin Youth Apprenticeship (YA) is a rigorous program that combines academic and related technical classroom instruction with mentored on the job learning for high school students. By training youth apprentices, employers play an active role in shaping the quality of their future workforce, improving the skill level of potential workers, and enhancing their competitive positioning in the marketplace. Employers, school districts, local consortiums, parents, and potential YA students are referred to the Youth Apprenticeship Program Operations Manual for general YA Program requirements.

Objective

The Wisconsin Science, Technology, Engineering, & Math (STEM) YA Program is designed to provide students with a working understanding of occupational and technical skills in both pathways within the Science, Technology, Engineering, & Math (STEM) industry. This program provides the framework for educators and industry to work together to produce work-ready, entry-level employees that will compete favorably in a global market, as well as, provide for post-secondary educational advancement while integrating work-based learning in the school and worksite.

The following features distinguish a YA Program from other similar youth school to work programs.

- Level Two Youth Apprenticeship is a two-year program for high school juniors and seniors with an interest in a particular field; i.e., mechanical or electrical engineering. One-year Youth Apprenticeship Programs are also available to pursue.
- Youth apprentices, parents, employers, YA program coordinators, and school districts enter into a written agreement approved by the Department of Workforce Development.
- Statewide skills are established by the industry, making the youth apprentice skill set more relevant to the state's employers.
- Youth apprentices are trained at the worksite by skilled mentors and are paid minimum wage or better for their work. Students average 10-15 hours/week.
- Youth apprentices receive a high school diploma and a Certificate of Occupational Proficiency from the Wisconsin Department of Workforce Development (DWD) at graduation.
- Youth apprentices may receive advanced standing credit and/or transcripted credit for the YA Program at a Wisconsin Technical College and/or at some four year colleges. See **Appendix F** for current details.
- Statewide skill standards focus on skills and knowledge needed by employers for entry level employment in the Science, Technology, Engineering, & Math (STEM) industry.

Students apply and are interviewed by Science, Technology, Engineering, & Math (STEM) employers for positions in the Science, Technology, Engineering, & Math

(STEM) YA Program. The state approved skill standards and program guide for the Science, Technology, Engineering, & Math (STEM) YA Program are used in both the classroom instruction and worksite learning. If the local school district is unable to provide the related technical classroom instruction courses, they may contract with their local technical college or employer practitioners to do so.

The skill standards are competency based. Competencies are performance-based outcome statements of occupational related skills defined by representatives of Science, Technology, Engineering, & Math (STEM) worksites throughout Wisconsin and aligned with national skill standards. The competencies in this program are aligned with curriculum objectives from the Project Lead the Way (http://www.pltw.org/) and STEM Academy (http://www.stem101.org/index.asp) high school engineering and biotechnology programs, as well as, the National States' Career Cluster Skill Standards in Science, Technology, Engineering, & Math (STEM), http://www.careerclusters.org/ for both of the Science, Technology, Engineering, & Math (STEM) Career Cluster pathways: Engineering & Technology and Science & Math.

The competencies will be taught at the worksite in combination with supportive, related technical classroom instruction. While the skill competencies are established statewide, program implementation and oversight occurs through local consortium committees to assure local needs are met.

Target Population

This Youth Apprenticeship occupational area focuses on having Science, Technology, Engineering, & Math (STEM) **Engineering & Technology** pathway YA students acquire basic skills pertinent to understanding and working with drafting and engineering technical documents in the first year along with the core employability and safety skills. Students will acquire basic concepts needed to read, edit, and create basic engineering technical drawings. The second year allows these students to develop further skills in a specific specialization depending on their worksite placement or area of interest. Choices of specialization include Mechanical/Electrical Engineering or Civil Engineering.

Science, Technology, Engineering, & Math (STEM) **Science & Math** pathway YA students will work in bioscience/biotechnology settings. There they will acquire basic skills pertinent to lab work and techniques in the first year along with the core employability and safety skills. In the second year, students will further develop testing skills and become proficient in a variety of bioscience tests and applications dependent on their worksite setting.

All students successfully meeting current high school graduation requirements and with a good attendance record for that year are encouraged to apply for the Science, Technology, Engineering, & Math (STEM) Youth Apprenticeship (YA) Program. The student must apply to the program in the year previous to program entry and be on

track toward fulfilling high school graduation requirements in their school district. SEE **Appendix G** for students entering or continuing the Science, Technology, Engineering, & Math (STEM) YA Program in 2011.

All Youth Apprentices must complete the industry-wide foundational skill competencies consisting of competencies in core employability skills and safety. The Required Skill competencies may be completed concurrently with the specific technical skills.

Potential youth apprentices will be required to complete a minimum of 450 work hours with 180 hours (2 semesters) of related technical classroom instruction for a Level One (1-year) Science, Technology, Engineering, & Math (STEM) YA Program or a minimum of 900 work hours with 360 hours (4 semesters) of related technical classroom instruction for a Level Two (2-year) Science, Technology, Engineering, & Math (STEM) YA program.

Science, Technology, Engineering, & Math (STEM) YA students are required to perform all of the Core and Safety skills. **Level One (one year)** YA students also are required to complete the one year Basics Unit. **Level Two (two year)** YA students are to complete an additional second one year unit in addition to the Level One requirements.

Science, Technology, Engineering, & Math (STEM) Units

Engineering & Technology Pathway-

- Engineering Drafting Unit- REQUIRED FIRST
- Mechanical/Electrical Engineering Unit
- Civil Engineering Unit

Science & Math Pathway-

- Bioscience Lab Foundations Unit- REQUIRED FIRST
- Bioscience Applications Unit

Science, Technology, Engineering, & Math (STEM) Program Responsibilities

The following responsibilities are outlined for individuals involved in the Science, Technology, Engineering, & Math (STEM) YA Program.

Students –

1. Maintain academic skills and attendance at the high school to remain on track for high school graduation.
2. Participate in progress reviews as scheduled.
3. Exhibit maturity and responsibility to meet requirements of employment as designated by the employer.

Parents or Guardians-

4. Ensure that adequate transportation is available to and from the worksite.
5. Participate in student progress reviews as scheduled.

School District-

6. Recruit students and coordinate student enrollment in the program with the consortiums and/or employers.
7. Integrate the YA Program related technical classroom instruction and worksite training into the student's overall education program with high school graduation credit issued for each semester successfully completed.
8. Participate in student progress reviews as scheduled.

YA Program Coordinators-

9. Apply and maintain approval from the DWD to operate a YA Program.
10. Ensure a minimum of 450 hours of worksite instruction/experience plus a minimum of 180 hours of related technical classroom instruction for each one year YA program.
11. Establish and meet regularly with an advisory committee that will identify when and where tasks will be taught during the Science, Technology, Engineering, & Math (STEM) YA Program.
12. Develop and maintain a yearly commitment with participating high schools, technical colleges, and local businesses to accommodate the number of students involved in the Science, Technology, Engineering, & Math (STEM) YA Program.
13. Establish and maintain a YA student grievance procedure.
14. Provide employer mentor training.

Related Technical Classroom Instruction Faculty-

15. Qualify in the specialty areas being taught in the YA Program.

Employers and Worksite Mentors-

16. SEE **Appendix B –** Science, Technology, Engineering, & Math (STEM) YA Implementation Guide for Employers.
17. Participate in a mentor training session and provide on the job training of the Youth Apprentices.

Department of Workforce Development-

18. Monitor national and state regulatory agencies, such as OSHA, for changes and impact on the Science, Technology, Engineering, & Math (STEM) Youth Apprenticeship Program.

Program Guide Organization

The competencies in this program are aligned with curriculum objectives from the Project Lead the Way (http://www.pltw.org/) and STEM Academy (http://www.stem101.org/index.asp) high school engineering and biotechnology programs, as well as, the National States' Career Cluster Skill Standards in Science, Technology, Engineering, & Math (STEM), http://www.careerclusters.org/ for both pathways: Engineering & Technology and Science & Math.

The Science, Technology, Engineering, & Math (STEM) YA Program also requires that Related Technical Classroom Instruction is provided to support attainment of the knowledge necessary to master the competencies. While recommendations for specific Related Technical Classroom Instruction are detailed separately in **Appendix C**, instructional requirements will vary depending on local consortium and advisory group decisions. It is strongly advised that local consortiums work with their advisory groups to determine appropriate Related Technical Classroom Instruction based on their local needs and resources.

The Youth Apprenticeship Program curriculum is written and organized according to the Worldwide Instructional Design System (WIDS) format and includes the Science, Technology, Engineering, & Math (STEM) YA Skill Standards Checklist and Course Outcome Summary (COS) for the program. Overall progress is documented on the Skill Standards Checklist which lists skill level achievement for each competency achieved. The COS outlines each skill competency with its corresponding performance standards and learning objectives. The Performance Standards describe the tasks and behaviors, as applicable, that employers should look for in order to evaluate the competency. The Learning Objectives outline the recommended content to be covered in the related technical classroom instruction. SEE **Appendix D** - Wisconsin Instructional Design System (WIDS) Format and Youth Apprenticeship Program Guide Terms and **Appendix E** - Use and Distribution of the Curriculum for further details.

Evaluation

The student must successfully complete the related technical classroom instruction and demonstrate the minimum skill level required on the Science, Technology, Engineering, & Math (STEM) YA Skill Standards Checklist for each competency according to the applicable curriculum. Worksite mentors and/or instructors use this checklist to evaluate the learner on each of the required skills. It is the responsibility of the mentor(s) to rate the students skill level on all tasks performed at the worksite.

Science, Technology, Engineering, & Math (STEM) YA Program Completion

Upon successful completion of high school and the Level Two (2 year) Science, Technology, Engineering, & Math (STEM) YA Program requirements, the youth apprentice will receive a high school diploma and the applicable Certification of Occupational Proficiency from the Department of Workforce Development indicating "Science, Technology, Engineering, & Math (STEM) Youth Apprenticeship." Youth Apprentices who successfully complete a Level One (1 year) Science, Technology, Engineering, & Math (STEM) YA Program and who are on track for graduation will be eligible for a Level One Certificate from the Department of Workforce Development. Furthermore, the YA students may;

1. Continue to work in the Science, Technology, Engineering, & Math (STEM) industry.
2. Apply to a registered apprenticeship.
3. Pursue a degree or diploma from a Wisconsin Technical College with advanced standing and/or transcripted credit.
4. Apply for admission to a four-year University of Wisconsin school with high school academic elective credit for admission.
5. Go into military service.

SEE **Appendix F** for current agreements for post-secondary credit at Wisconsin Technical Colleges and University of Wisconsin colleges.

This curriculum was developed through a Grant from the Wisconsin Department of Workforce Development to the University of Wisconsin-Oshkosh's Center for Career Development and Employability Training (CCDET)

Appendices

Appendix A - Work Contracts, Child Labor Laws, Liability & Insurance

Appendix B - Science, Technology, Engineering, & Math (STEM) YA Implementation Guide for Employers

- Benefits to the Employer
- Role of the Employer
- Role of the Mentor
- Checklist for Program Participation
- Checklist for Program Operation
- Frequently Asked Questions
- Work Contracts, Child Labor Laws, Liability & Insurance (insert Appendix A)

Appendix C - Recommended Related Technical Classroom Instruction

Appendix D - Wisconsin Instructional Design System (WIDS) Format and Youth Apprenticeship Program Guide Terms

Appendix E - Use and Distribution of the Curriculum

Appendix F - Post Secondary Credits

Appendix G - Grandfather Clause – Program Transition Guidelines

Appendix H - Science, Technology, Engineering, & Math (STEM) Skill Standards Checklist

Appendix I - Science, Technology, Engineering, & Math (STEM) YA Course Outcome Summary: Overview and Table of Contents (COS)

Appendix J- Science, Technology, Engineering, & Math (STEM) Required Skills Curriculum (Units 1-2)

Appendix K- Engineering Drafting Unit (Unit 3)

Appendix L- Mechanical/Electrical Engineering Unit (Unit 4)

Appendix M- Civil Engineering Unit (Unit 5)

Appendix N- Bioscience Lab Foundations Unit (Unit 6)

Appendix O- Bioscience Applications Unit (Unit 7)