The Department's Educational Philosophy

All students should gain a better understanding and appreciation for the impact of today's technology in an international marketplace. Students will also learn the importance of leisure time productivity in the development of functional products through the safe use of tools, machines and materials. As a result of these activities, students will develop a healthy, positive, and responsible work ethic that is fundamental in today's society. In addition, the program challenges a wide diversity of skill levels, placing the students at various entry levels within a continuum from basic, and no prerequisite, to advanced, at any level.

Guiding Principles

An essential component of a well-rounded education includes participation in a diverse offering of exploratories, such as offered in the Industrial Technology Department. All students should have the ability to understand human needs, recognize the best solution and construct a functional tangible product.

- Student enrollment will increase with an effective course offering.
- Students will learn and understand the Universal Systems Model.
- Students will be able to identify and explain the 8-Step Engineering Process in creating the best possible problem-solving solution.
- Students will be able to interpret and demonstrate problem-solving solutions to scale using graphic representations such as sketches, isometrics, orthographic projections and multi-view drawings.
- Students will learn and understand the importance of safe operating procedures in a lab or home environment.
- Students will demonstrate the safe use of common hand and machine tools prior to application.
- Students will share factual information and independent thought through tangible and verbal expression.
- Students will have the opportunity to work within a cooperative learning environment while emphasizing the importance of independent learning skills.
- This course presents the possibilities for student career development opportunities as well as leisure time activities.
- This course is integrally related to mathematics.

TECHNICAL DRAWING I: COURSE #760
TECHNICAL DRAWING II: COURSE #762/763
TECHNICAL DRAWING III/IV: COURSE #764/765

Course Frequency: Full year, 5 times a week
Credits: Five
Prerequisites: **I:** None
II: Technical Drawing I
III/IV: Instructor's Permission, Technical Drawing I and II

TECHNICAL DRAWING SURVEY: COURSE #761

Course Frequency: Full-year, alternate days
Credits: Two and a half credits
Prerequisites: None

Background to the Curriculum

These courses were developed through a summer R and D program and will continue to undergo periodic review and revision as necessary. The development process is a culmination of several existing factors: ABRHS Program of Studies, the newly-constructed facility, existing equipment, alignment with the Massachusetts State Frameworks, and personal values of the instructor, based on 22 years experience in technology education and 14 years in industry.

This curriculum offers two distinct paths – one focusing on mechanical drawing, using solid modeling software, and the other architectural drawing, using architectural design software. Within both programs, prior to computer usage, students will be given instruction in rudimentary sketching techniques, progressing to using basic manual drafting tools to create isometric and orthographic projection drawings, or elevations, floor plans, etc.

Core Topics/Concepts/Skills

Mechanical

- PTC (Parametric Technology Corp.)
- ProDesk Top Design Software: Students will seek proficiency on an individualized level.
- Universal Systems Model: Manufacturing Process – inquiry, comprehension, procedural, and communication skills
- Engineering Design Process: product development, comprehension skills, procedural skills, develop spatial and logic skills
- Drafting: pencil/paper, manual drafting tools, graphic representation, pattern making

- Design Challenges: an emphasis on designing solutions to problems in the real world, applying problem-solving strategies; value collaboration, respect healthy competition
- Mass Production Opportunity: Actual modeling or production can take place; coordinate with wood technology class for possible mass production unit.

Architecture

- Universal Systems Model – Manufacturing Process: inquiry, comprehension, procedural and communication skills
- Graphisoft Archi CAD 8 software
- Engineering Design Process: product development, comprehension skills, procedural skills, develop spatial and logic skills
- Drafting: pencil/paper, graphic representation
- Model House Construction: comprehension skills, application skills, procedural skills, communication skills
- House Plans: Students will make decisions, solve multi-dimensional problems, think logically and spatially.
- Zoning Laws: Students will understand source, process, variances, and easements.
- Building Codes: Students will understand source, process and exceptions.
- Architectural Scale: Students will draw to scale floor plans, elevation, electrical and plumbing.
- Professional Standards: Students will research educational requirements for a career as an architect.
- Construction Budget: Students will understand budget implications.

Learning objectives

Universal Systems Model – through the application of this model

Mechanical and Architecture

1] Goal: Students will understand the objective.
2] Input: Students will know the seven resources required to create technology.
3] Process: Students will develop and design Production Control Process.
4] Output: Students will develop a final functional product.
5] Feedback: Students will be able to analyze, synthesize, and apply the results.
6] Impact: Students will understand the impact on the environment and society.

Engineering Design Process

1] Identify the problem: Students will be able to identify, understand, and articulate the problem.
2] Research the problem: Students will explore and investigate existing solutions.
3] Brainstorm: Students will develop critical thinking skills through cooperative learning.

4] Select best possible solution: Students will analyze information, make informed choices, and collaborate on the final solution.
5] Construct a prototype:
- Students will work cooperatively.
- Students will understand the aesthetic and functional aspects of the product.
- Students will interpret graphic representations.
- Students will organize information.
- Students will construct using hand/machine tools.

6] Test and Evaluate: Students will analyze and assess the prototype.
7] Communicate the solution: Students will describe through oral or written format the best possible problem solution or need
8] Redesign: Students will incorporate test and evaluate results through a cooperative learning environment.

Architecture/Construction Technologies

In construction technology the students will be aware of various material, processes and systems to build structures.

1] Model House Construction:
- Students will interpret house plans.
- Students will organize material.
- Students will construct a model house.

2] Zoning Laws: Students will understand source, process, and exceptions.
3] Building Codes: Students will understand source, process, and exceptions.
4] Professional Standards: Students will be aware of licensing requirements, education, and unions.
5] Understand and interpret floor plans: Students will read, articulate, and create.
6] Understand scale drawings: Students will read, create, and articulate.
7] Identify elevations: Students will recognize and create.
8] Identify construction materials: Students will distinguish and evaluate.
9] Site development: Students will understand watershed protection, clearing, utilities, sewerage, and maintenance.

Mechanical and Architecture Manufacturing

Students will design a system for mass production.

1] Universal Systems Model: Technology system fulfillment
2] Engineering Design Process: Consumer need, pictorial and multi-view drawings
3] Production Control: Resource deployment, individual accountability

4] Quality Control: Develop quality assurance program
5] Finance: Spreadsheets, product cost
6] Work Ethic: Students will understand the importance of a responsible approach to any task.

Assessment

- Quizzes
- Portfolios – tutorials/design challenges
- Presentations
- Finished product
- Meaningful class participation
- Computer Skills
- Process comprehension (Universal Systems Model, Engineering Design Process, Manufacturing, and Construction)

Materials and Resources

Reference Texts

- Arch, B Kulisev Lubomir, Graphisoft ArchiCad 8 Training Guide, First edition, Sydney, Australia, email: actg-author@aon.at
- Hutchinson, John, Designing with ProDeskTop, 2005, Designed World Learning, LLC, Wall, NJ
- Goodhue, P Lincoln, Simple Construction Work in Paper and Cardboard, 1922, Ideal School Supply Co., Chicago
- Internet