

SAME-TEC

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# Amazing Light, Fiber and Telecommunications Demonstrations

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# Introduction



Naugatuck Valley Community College  
[www.nvcc.commnet.edu](http://www.nvcc.commnet.edu)

Established in 1962 originally known as Waterbury State Technical College and Mattatuck Community College.

Combined and renamed Naugatuck Valley Community-Technical College in 1992. It was later renamed Naugatuck Valley Community College.

# New Technology Building



NVCC is nationally recognized as a leading Technology education institute. The Engineering Technologies Division offers 12 technology degree programs and 14 technical certificates.

Highly qualified faculty and advanced technological lab facilities provide an exceptional learning environment.

Enrollment every semester is approximately 5,000 credit and 7,000 non credit students.

# The Division of Engineering Technology

## Programs and Certificates

Automated Manufacturing  
Engineering  
Automotive Technician  
Technology  
CADD Engineering Technology  
College of Technology -  
Engineering Science Pathway  
College of Technology -  
Technological Studies Pathway  
Construction Technology  
Electrical Engineering  
Fire Technology and Administration  
Fuel Cell Technology  
Industrial Management and  
Supervision Technology  
Mechanical Engineering Technology  
Plastics and Rubber  
Engineering Technology  
Quality Assurance

# Why Demonstrations

Demonstrations provide a rich opportunity to explore and view new learning tasks from a different perspective. Watching a teacher demonstrate a new skill can spur a student to work more independently. Demonstrations help bridge the technical concepts to more types of learners.

Hands-on learning provides learning by doing--helping a student to acquire knowledge and skills outside of books and lectures. Learning can occur through work, play and other life experiences.

# Demonstrations

## Basic Concepts of Fiber Optics

T.I.R.

Snell's Law

Polarization

Light absorption/reflection

## Basic Telecommunication Concepts

Coding messages

Converting light into sound

Sending voice over fiber

# Basic Concepts of Fiber Optics

## Total Internal Reflection ( TIR)

Optical concept of how light travels down a fiber.

## Snell's Law

Index of refraction of materials, instrumental in design of core and cladding of fiber

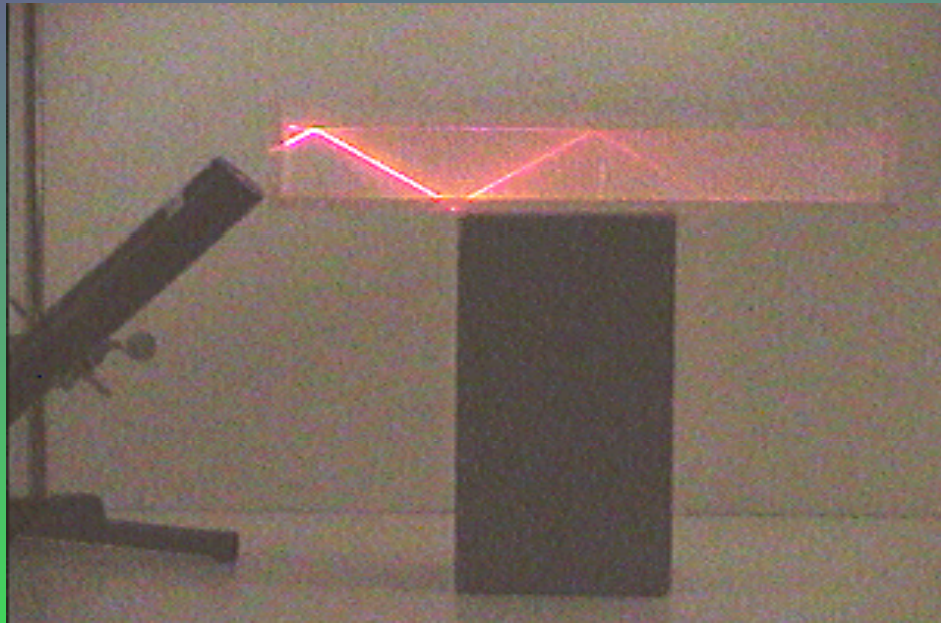
## Light Absorption

Concept of how “white” light is made up of several Wavelengths ( roygbiv)  
Some of the wavelengths can be reflected or absorbed.

## Polarization

How light can be controlled to your benefit

# Understanding TIR



Condition for total internal reflection is that the incident angle for a ray of light is greater than the critical angle.

# Snell's Law

Disappearing Beaker Demo:

Introduced

How light travels

Index of refraction in materials

How this is important in fiber optics

# Introduction to Light

White light made up of red, orange, yellow, green, blue, indigo, violet ( ROYGBIV)

Diffraction grating  
Thickness of hair

Fluorescence – effects light in what light gets absorbed and what light gets reflected

LED blue, red, green lights demo

# Basic Telecommunications Concepts

## Coding Messages

Shows how words can get converted into numbers or digits

Use Morse code to send message

## Converting light into sound

Shows how light is converted into electric signal into sound

Shows relationship to Invisible light ( Infrared) to sound

Introduced Electro-magnetic spectrum

Visible light band

# Basic Telecommunications Concepts

Sending voice over fiber

Shows how sound is converted into electronic signals  
Into light signals

Shows how light travels down a fiber

Shows how light is converted into electronics signals  
Back into sound

# References

[http://newali.apple.com/ali\\_sites/ali/exhibits/1000328/Demonstrations.html](http://newali.apple.com/ali_sites/ali/exhibits/1000328/Demonstrations.html)

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<http://www.nebhe.org/info/pdf/programs/PHOTON2/ExplorationsInOptics.pdf>

ComTech A Curriculum in Communications Technologies  
Project ComTech, a collaborative effort among Harvard College Observatory, the Technology Education Association of Massachusetts, and Massachusetts Bay Community College, has developed an innovative, modular, discovery-based curriculum for grades 7–9 technology students.

<http://www.cfa.harvard.edu/sed/projects/comtech.html>

<http://www.stcc.edu/academics/telecommunications.asp>