

Distance Education for Micro and Nanotechnology

Rick Vaughn
Faculty Chair STEM, Rio Salado College
Distance Education, MNT-EC



RIO SALADO COLLEGE

A MARICOPA COMMUNITY COLLEGE



The end of
every Zoom
meeting.



Who



- Rick Vaughn
- Nancy Louwagie
- Andy Bell
- Tanya Faltens
- Marco Curelli
- Paul Weber
- YOUR NAME GOES HERE



WHY



RIO SALADO COLLEGE
AMERICA'S ONLINE COMMUNITY COLLEGE

The Distance Education Focus Group (DEFG) fosters collaboration in Micro and Nanotechnologies through high-quality, authentic learning opportunities that are accessible to students in multiple locations.



A DAY IN THE LIFE



RIO SALADO COLLEGE
AMERICA'S ONLINE COMMUNITY COLLEGE



WHERE



- Rio Salado College was founded in 1978 to challenge the limits of tradition.
- “The College Without Walls” or “The College Within Everyone’s Reach”
- Physically located in Tempe Arizona as part of the ten-college Maricopa Community College District
- We serve more than 50,000 students a year in a wide-variety of modalities and locations

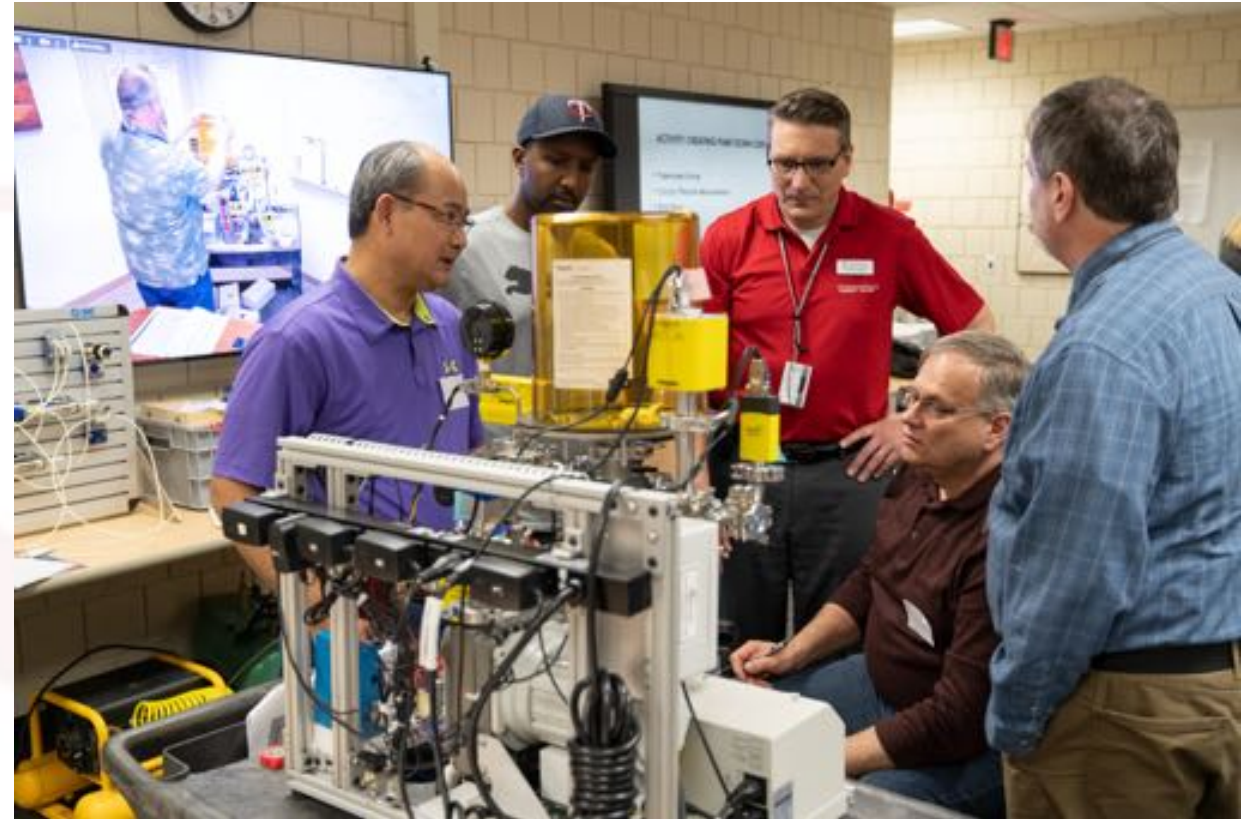
WHAT - Distance Learning



- Support creation of new programs and scaling efforts of existing programs using hybrid, online, and alternative lab modules
- Develop single curated online repository for distance education modules, classes, and programs
- Provide hybrid and alternative options for internships, workshops, and work-based learning opportunities through partnerships with industry and universities

Distance Learning

- Identify MNT distance learning programs along with their credentialing opportunities
- Establish processes for enrolling participants in MNT distance learning programs
- Promote programs and enroll participants
- Develop networks to effectively deliver MNT sub-specialization content (for example, lasers, vacuum technology, characterization, others)



HOW



Activity 1.1: Strengthen current [MNT programs] and foster creation of new MNT programs across the United States

- Promote MNT resources
- Identify key industry locations
- Partner with local schools
- Invite new participants

Activity 1.2: Develop single curated online repository and distance education opportunities

Activity 4.2 Create a needs-based industry database

- Inventory participant educational assets
- Develop repository
- Define distance learning modality 'buckets'
- Utilize in Partnerships
- Maximize accessibility of assets

WHEN



- **NOW**

**Your project has created great resources.
Let's continue to use them.**

Join the Distance Education Focus Group!



Assets at Rio Salado



Professional Marketing – Lane Terralever Approximately \$70,000

[Nanotechnology at Rio](#)

Assets at Rio Salado



Virtual Clean Room at Arizona State University (ASU)

Developed as part of a Research Experiences for Teachers (RET) funded by the National Nanotechnology Coordinated Infrastructure (NNCI) now Nanotechnology Collaborative Infrastructure –Southwest (NCI-SW)

Approximate Cost: \$5000

- [Virtual Clean Room](#)
- [Google Glasses - 3D VR](#)

Assets at Rio Salado



Undergraduate Research with the Southwest Center for Microsystems Education (SCME)

[SCME](#)



SCME Support Center for Microsystems Education
<http://www.riosalado.edu/programs/technology/learn/default.asp>

Micro Pressure Sensor Fabrication and Characterization
Southwest Center for Microsystems Education
Rio Salado College

Rio Salado College

EXPOSE

Photolithography is used to fabricate Micro Pressure Sensors at the University of New Mexico Science and Technology Park.

COAT
↓
EXPOSE
↓
DEVELOP
↓
ETCH & DEPOSIT

COAT

The purpose of coat is to apply a uniform thickness of photoresist to the wafer. The thickness and uniformity of the photoresist is critical for ensuring the sensor fabrication MCMC manufacturing process.

EXPOSE

The wafer is placed into a Mask Aligner. UV light shines through the holes in the mask to expose the photoresist in specific areas.

DEVELOP

The exposed wafer is submerged in a developer solution. The developer dissolves the unexposed areas, leaving the photoresist in the exposed areas.

ETCH & DEPOSIT

CHARACTERIZE

Optical image with white arrow showing location of Scanning Probe Microscope (SPM) characterization site.

Scanning Probe Microscope (SPM) with 4000x magnification.

3D surface plot of the sensor.

SEM images of the sensor surface.

The work presented was funded in part by the National Science Foundation Advanced Technology Education program. Department of Undergraduate Education grants DUE #1001108 & DUE #1198076. Images Copyright by the Support Center for Microsystems Education, The Regents of the University of New Mexico.

NT-MDT Spectrum Instruments

Assets at Rio Salado



Curriculum Materials

Source: [Penn State University Nanotechnology Applications and Career Knowledge \(NACK\) Network](#)

Current: [Maricopa Center for Curriculum Transfer and Articulation \(CCTA\)](#)

Future: [Optics and Photonic Circuits](#)

FUTURE DIRECTIONS



- Customized Curriculum and Courses
- Co-Enrollment and/or Articulation
- Distance or hybrid/regionalized versions of all labs
- Curated repository of resources with concierge-style service
- Assistance with online conversions/hybridization of traditional materials/labs
- Expand opportunities for distance education internships, workshops, and work-like experiences
- Maximize accessibility of these resources

Accessibility

- [Universal Design for Learning](#)
- [National Center on Accessible Educational Materials](#)



RIO SALADO COLLEGE

AMERICA'S ONLINE COMMUNITY COLLEGE

SUMMARY



The Distance Education Focus Group (DEFG) fosters collaboration in Micro and Nanotechnologies through high-quality, authentic learning opportunities that are accessible to students in multiple locations.

We will

- **support the creation of new programs and scaling efforts of existing programs using hybrid, online, and alternative lab modules;**
- **develop a single curated online repository for distance education modules, classes, and programs;**
- **provide hybrid and alternative options for internships, workshops, and work-based learning opportunities through partnerships with industry and universities;**
- **identify MNT distance learning programs along with their credentialing opportunities;**
- **establish processes for enrolling participants in MNT distance learning programs;**
- **promote programs and enroll participants; and**
- **develop networks to effectively deliver MNT sub-specialization content (for example, lasers, vacuum technology, characterization, others).**

JOIN US

Rick.Vaughn@riosalado.edu

(480) 517-8661



RIO SALADO COLLEGE
AMERICA'S ONLINE COMMUNITY COLLEGE

