Using eLearning to Support Remote Instruction

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Our New Reality

Some of the Challenges of Remote Instruction

- Reimagining lectures
- Student engagement
- Finding effective teaching resources/content
- Hands-on labs
- Effective and reliable assessment
- Data privacy
- Multiple time zones
- Language barriers
- Internet connectivity
- Synchronous vs asynchronous instruction

How NYIT Has Approached Remote Instruction

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New York Tech's Approach to Remote Instruction

Blended Course

- Face-to-face class sessions accompanied by online materials and activities
- Online materials are not intended to "replace" face-to-face class time but instead supplement and build upon the content discussed in the classroom

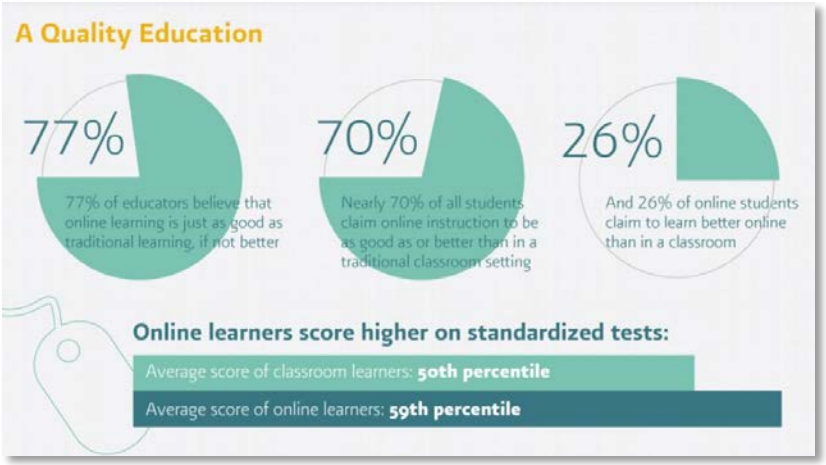
Hybrid Course

- Online components replace a portion of face-to-face class time
- Online interactions can be synchronous (i.e. Zoom) or asynchronous (i.e. online discussion forums, VoiceThread)

- College of Engineering went 20% in-person, 80% of classes hybrid (Hybrid Remote Instruction – HRI)
- Labs and first-year classes held in-person – but with HRI options available.
- Extensive investment in technology

Online Education CAN be Very Effective…

- **Online education**, including online teaching and learning, **has been studied for decades**. Numerous research studies, theories, models, standards, and evaluation criteria focus on quality online learning, online teaching, and online course design.
- What we know from research is that **effective online learning results from careful instructional design and planning**, using a systematic model for design and development.
- Typical planning, preparation, and development time for a fully online university course is **several months before the course is delivered**. Faculty are usually more comfortable teaching online by the second or third iteration of their online courses.



https://ep.jhu.edu/faculty/learning-roadmap-for-new-online-instructors/comparing-face-to-face-and-online-teaching

Teaching Face-to-Face vs. Online

Types of Differences	Teaching Face-to-Face	Teaching Online
Pedagogical*	Mostly synchronous interaction, content presented as lectures, hands-on, pencil-and-paper assessments, content can be planned session-by-session	Mostly asynchronous interaction, discussion forums, various means of content presentation, alternative assessments (e.g., collaborative/research projects, presentations), content must be planned out in advance of development
Operational	Held in the same geographic location at the same time—regularly scheduled sessions	Class is in session 24/7
Students	Often live in close proximity to campus, schedule allows for classroom sessions	Often working professionals, can be globally dispersed, personal availability can vary widely
Role of Instructor	Lecturer, sage on the stage that transfers knowledge to students	Facilitator, helps the students construct knowledge by guiding discussions

Watch this video:
https://ep.jhu.edu/faculty/learning-roadmap-for-new-online-instructors/comparing-face-to-face-and-online-teaching

General Hints for an Online Engineering Course (1)

Set Clear Expectations and Rubrics

Segment Your Content

Curate Content

Communication is Critical

General Hints for an Online Engineering Course (2)

Assignments

- ***If you would normally have a single assignment with five questions,*** break it up into five small assignments that are dispersed in between relevant content.

Video

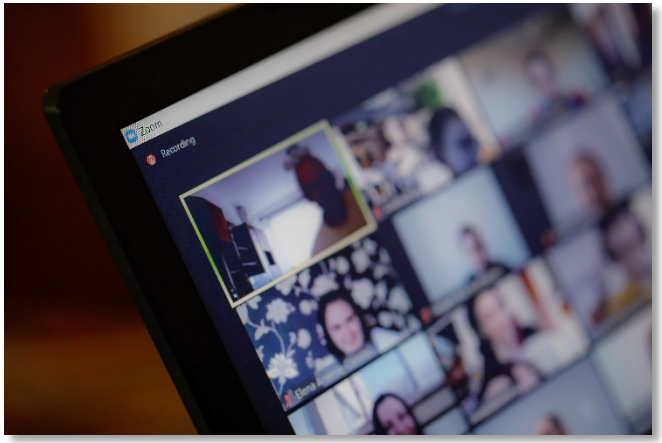
- ***If you use a lot of video,*** use Kaltura's quizzing feature. This will stop the video at prescribed points and show your students questions you've created.

Quizzes

- ***If you normally give a quiz at the end of the week,*** break it up into two or three small ones and position them after related content

Engagement

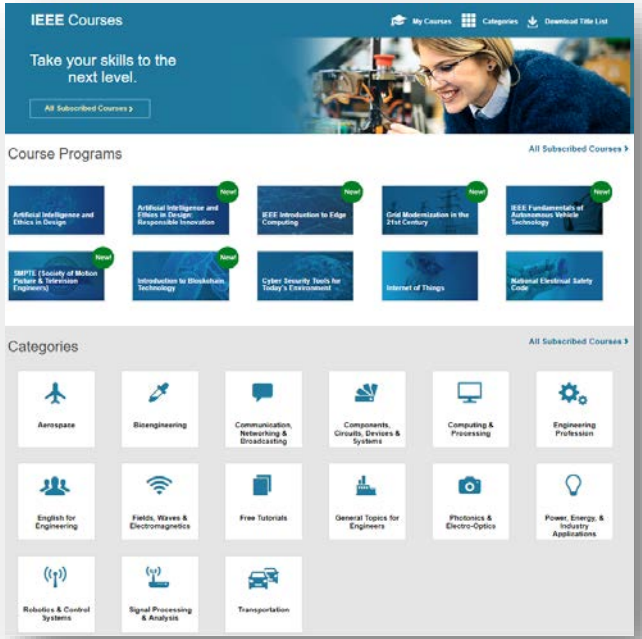
- **Connect students with one another**. You may need to initially force this, as they are not in the same physical space, and the isolation can be overwhelming.
- Don't lecture! **eLearning and video content from publishers**, your recorded videos and other content **should be provided as on-demand basis.**
- **Live (synchronous) sessions should be flipped**: students do groupwork projects, have discussions, and Q&A.
- **Choreograph** your **module lesson plan sequence**: (1) eLearning module, followed by (2) polling, followed by (3) quiz, followed by (4) video, etc.



"The one who does the work, does the learning."

Use eLearning to Differentiate Instruction

- In place of lectures
- Create homework not from the textbook
- Tutoring and supplemental instruction
- Advising
- Research
- Projects



Group Work

- Select online groups of **four to six people**, no larger groups
- If possible don't let groups to be randomized - **allow self-selection**
- **Create a structure** for each group:
  - Set **time schedule to submit plans**
  - Require **basic team roles** to be determined and **submitted**
  - Require **scheduled internal team meetings** as well as **meetings with you**
  - Set **rubrics for team members' contribution**

Assignments

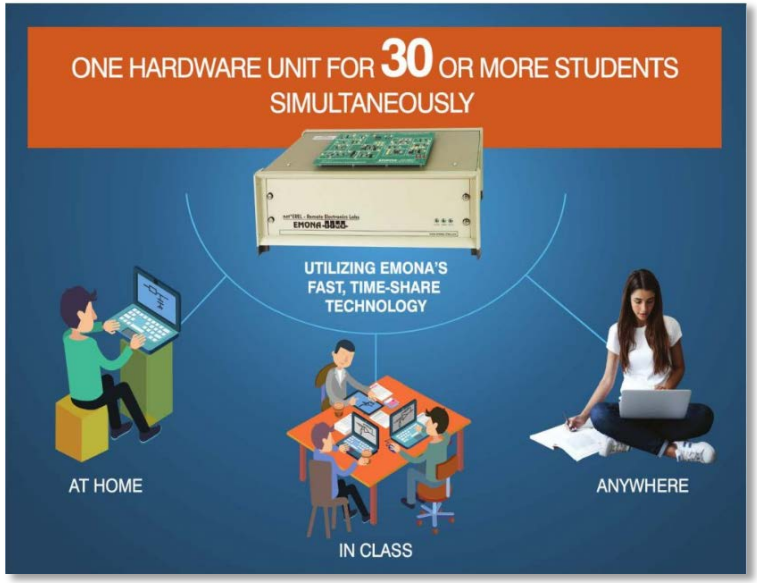
- Use a rubric
- Document your feedback
- Add feedback responses for quiz questions
- Continuously improve your course
- Hold live sessions

Instructor Resources

- **IEEE eLearning Library** (https://ieeexplore.ieee.org/courses/home)
- **Merlot Multimedia Resources** (https://www.merlot.org/merlot/index.htm)
- **“within” Virtual Reality App** (https://www.with.in/)
- **Examples of Available Lectures**
  - Electronic and Electrical Engineering Lectures: https://www.youtube.com/channel/UCjALws4XTgfLyNnvXnKPj-g/playlists
  - 200 on-line lectures covering all subjects of Digital Electronics on YouTube at: http://youtube.com/user/billkleitz
  - VHDL Basics and FPGA Impementation (Intel, Altera and Xilinx): https://www.youtube.com/playlist?list=PLBOhtamYB1hj8CJiOhz2F9kCQwcY6t5af
  - Introduction to Cryptography by Christof Paar: https://www.youtube.com/channel/UC1usFRN4LCMcfIV7UjHNuQg/videos

Online Labs

- Example Vendor - **Emona Multi-User, Remotely Controlled Experiments in Electronics and Telecoms**
- Emona offers a range of hardware experiments (NOT SIMULATIONS) which classes of students use a single equipment to carry out experiments in real time.
  - Easy student access: From anywhere on web browser, log on with USERNAME/PASSWORD
  - Many students can run independent experiments simultaneously due to very fast time-share technology



Online Labs

- Example Vendor - **Harvard's LabXchange has just released a suite of lab simulations with assessments that focus on basic molecular biology techniques**

Faculty Need Vetted Online Content

Publishers are the ideal source for peer-reviewed content that every student can access online

- Faculty say they're working up to 60% more
- Finding and vetting content that all students can access takes a lot of time
- Engineering libraries can help by providing vetted resources
- Online instructional resources that are peer-reviewed and globally relevant allow instructors to focus on student support while still meeting accreditation criteria

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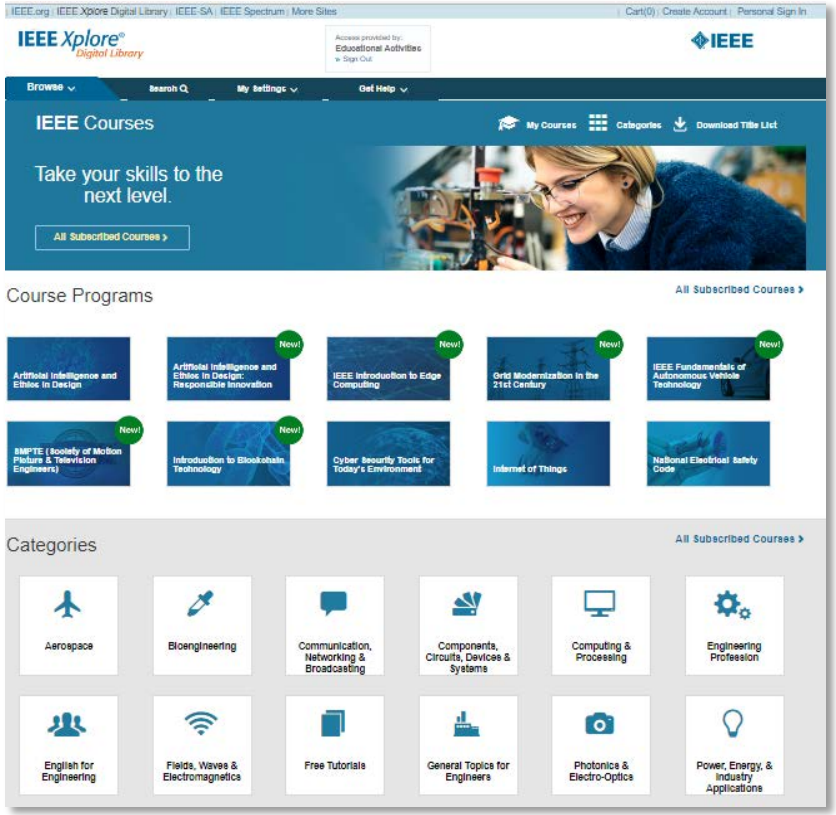
IEEE eLearning Library: Peer-Reviewed Online Library Resource

- Hundreds of engaging, multimedia courses developed by leading experts from around the world
- Entire library of online courses are peer reviewed
- Online courses are available 24/7 and can be accessed from anywhere in the world on the IEEE *Xplore* Digital Library
- Content supports a variety of engineering curriculum areas as well as Career Preparation topics



Essential eLearning Topics for Engineering Education

Aerospace	Bioengineering	Career Development	Communications
Components, Circuits, Devices & Systems	Computing	Emerging Technologies	Fields, Waves, & Electromagnetics
IEEE Standards	Photonics & Electro-Optics	Power & Energy	Robotics
Signal Processing & Analysis	Telecommunications	Transportation	

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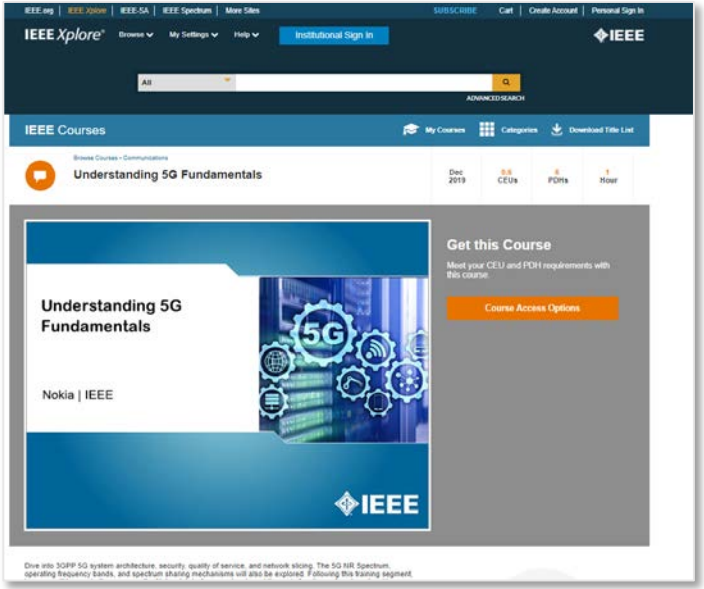
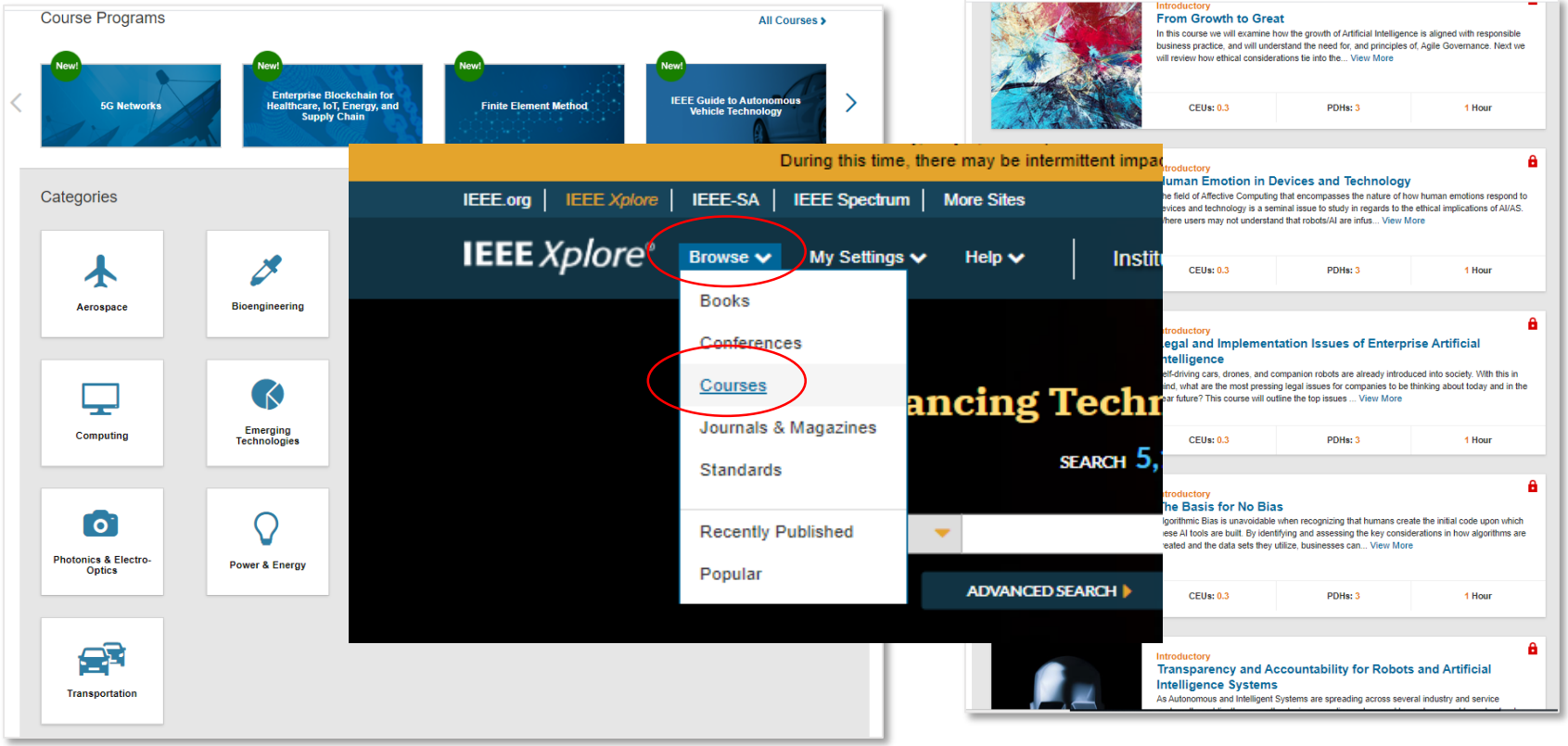
New York Tech's Experience with IEEE eLearning Courses

- Graduate level ECE course "Silicon IC Fabrication"
  - Selected two eLearning courses:
    - Interconnect Technology for 32 NM and Beyond
    - Dealing with Issues in VLSI Interconnect Scaling
  - Students are given about 3 weeks to complete the course
  - 25 students in the course

- Graduate level ECE course "Digital Communication"
  - Selected two eLearning courses:
    - Understanding 5G Fundamentals
    - Green Radio Techniques for Improved Wireless Basestation Design



IEEE eLearning Content Can Supplement Many Engineering Classes



Technical English Challenges Complicate Remote Instruction

- English is the international language of engineering, and a job requirement for graduating students
- It is hard for international students who struggle with technical English to learn these subjects remotely
- eLearning programs like IEEE English for Technical Professionals help students master technical English before attending graduate engineering classes

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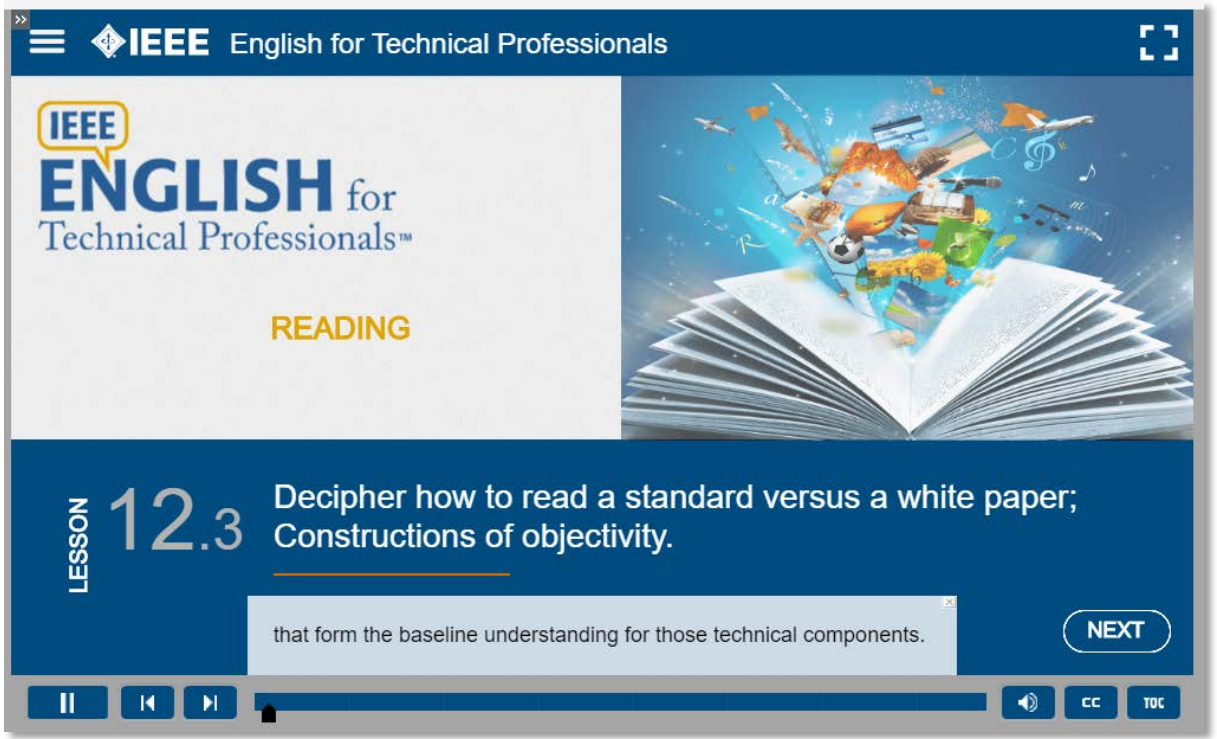
How NYIT Uses English for Technical Professionals



Supporting University Continuing Education Programs

- Alumni and other working professionals are experiencing career displacement due to the pandemic
- eLearning courses can be offered through the university:
  - Workforce retraining
  - Alumni services
  - Career services

Questions?

Thank you!