ME NEWS





#### **Division Chair's Letter**

Dear ASEE Mechanical Engineering Division members and fans:

Well, it's certainly been a year unlike any other. COVID-19 has really impacted our lives in so many ways. With respect to ASEE, of course, we now know that the upcoming national conference, originally scheduled for Montreal, will now be held virtually. I'm sure that, like me, you all have significant experience in that realm as most, if not all, courses are being taught virtually right now. While some courses are easy to adapt to this format, others, particularly those with significant hands-on applications such as labs and projects (think capstone design), are not so easy to adapt. And for many of us, myself included, we have never taught in this format before.

To better prepare all of us for this, I am sure you have seen a lot of material on how best to teach your courses. Much of this information comes from ASEE and quite likely from members of our very own ME Division. We hope that you will be able to participate in the upcoming virtual conference where we can continue to learn about and discuss technologies and platforms to support such online learning while not sacrificing student success and skill retention. So please plan to attend and share your own ideas, and gather new ones. Strengthen your old connections with peers all over the continent, and forge new ones.

If you would like to play an active role with the ME Division, there are lots of ways to get involved. The Awards Selection Committee does the important work of recognizing excellence through the prestigious Ralph Coates Roe Award and the Outstanding New Mechanical Engineering Educator Award. Or join the Executive Committee and shape the division's future, whether as an at-large member or cycling through the leadership positions of Secretary/Treasurer, Program Chair, and Division Chair.

Please feel free to contact me at the email below if you have interest in getting involved at any level. Or virtually come to the Business Meeting at the conference in June, Tuesday 5pm. The ME Division leaders are a great group of people, and my own career has been enriched by getting to know and work with them.

Speaking of which, I am grateful to Diane Peters, our newsletter editor who put this issue together. And to Tom DeNucci, Program Chair who has been coordinating all of the reviews for the 60+ papers in 11 technical sessions plus a poster session. Thank you to all who submitted work, and all who helped with reviews! I'm looking forward to virtually seeing you in June.

With best regards,

Matt Gordon, Professor and Chair Mechanical and Materials Engineering Department University of Denver ASEE ME Division Chair 2019-20 <u>Matthew.gordon@du.edu</u>

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#### **ASEE Annual Conference**

In light of the COVID-19 situation and associated issues, ASEE has decided to convert the Annual Conference, which was scheduled to be held in Montreal, into a virtual conference. You can still publish your paper, although presentations will be handled differently than the usual conference presentation. If you are an author, you should have received an e-mail from ASEE with details on how to record and upload your presentation; if you are a participant, you'll be able to view presentations and then participate in a Q&A session with authors of the presentations in each session.

It's a major disappointment to many people, who had hoped to see their friends and colleagues at the conference, but many of the same features of the conference will be present – papers will be presented and published, and many workshops will still occur. There will be a business meeting for the division, and ASEE is still sponsoring a Division Mixer. We'll also have an awards presentation for our division's awards. The cost of participating in the virtual conference will be less than the usual conference experience, in addition to the savings on travel costs, so there's at least a small silver lining in this large, dark cloud.

We are looking for moderators for sessions, so if you're participating in the virtual conference and are willing to serve as a moderator, contact Tom DeNucci (<u>Thomas.w.DeNucci@uscga.edu</u>). We will also be electing our new leadership team at the business meeting, so plan to attend if you're interested in leadership positions! (Note that the division meeting is the one part of the virtual conference that you can attend WITHOUT registering for the conference.)

#### **Tips on Remote Teaching**

When COVID-19 began to present serious issues, most of us were having a seemingly normal semester or quarter. Most, if not all, universities had to pivot rapidly to some form of online, remote, or virtual teaching to finish out the term. Those that have a spring or summer term, after winter is over, may have an entire term when students don't come to campus. Our members were asked for their tips, stories, or other contributions on remote teaching and what they're doing due to COVID-19, and several of them responded.

#### From Sam Bechara, Colorado State University:

My colleague Dan Baker and I put together an "Online Teaching Tools Menu." (Note, their menu is included at the end of this newsletter.)

#### From Debra Mascaro, University of Utah:

I teach a first-year programming course in Mechanical Engineering at the University of Utah. The students build and program robots that fire ping pong balls at targets (https://www.youtube.com/watch?v=FPEQW6VzwFo). When classes went online here, the students had already built the robots and written a lot of Arduino code that let them control and test the functionality of the robot, and were ready to start writing the competition code. Since they had already invested so much in the project, I wanted them to be able to carry on as normally as possible, so I programmed MATLAB apps with a virtual robot to check them off on the project assignments. Here is a video of one of the apps (which I plan to make much cooler over the weekend!): https://youtu.be/LidIIL-Ccng.

#### From Nathan Kahir, George Mason University:

Rapid Transformation of Mason Mechanical Engineering's Senior Design Projects due to COVID-19 Senior mechanical engineering students at George Mason University are required to complete a twosemester capstone design experience, Senior Design I and II, and all projects are sponsored by industry partners. During the fall semester, students start with a problem statement developed by their sponsors, craft statements of work. focused write systems requirement's documents and end the semester with critical design reviews. They continue in the spring semester with fabrication, testing and validation, and culminate with a "Capstone Day" where teams showcase their creativity and demonstrate the functionality of their design.

When the Mason students left for spring break, they did not anticipate that the university would close access to facilities and switch to online delivery of classes for the remainder of semester. This posed a challenge for the instructors of the Senior Design II course: How to provide a challenging fabrication and testing experience when students cannot enter any laboratories? With the guidance provided by the department chair, instructors very quickly adjusted the course learning outcomes and required students to explore a richer analysis of their most important parts or assemblies. Students could perform additional calculations and/or make use of finite element software to further improve their designs. The senior design will culminate with a "Virtual Capstone Symposium" on May 12, 2020 where each team will present to a larger audience. Please refer to https://mechanical.gmu.edu/connections/senior-design-capstone for the agenda and access details if you would like to participate in the virtual symposium. It is scheduled for 8:00 am – 5:00 pm and you are welcome to join any part of the day or for the entire day.

Submitted by Dr. Nathan M. Kathir, P.E. (CO), Director of Senior Projects and Dr. Erik Knudsen, Department of Mechanical Engineering, George Mason University, Fairfax, VA.

#### From Eleazar Marquez, Rice University:

The COVID-19 pandemic created a sudden disruption in pedagogies and posed challenges for both students and faculty. When I was notified about transitioning from classroom instruction to remote synchronous mode, I was forced to make instructional adjustments that were outside my comfort zone. It took me several days to improvise a cohesive, practical plan because the inperson atmosphere was going to be absent.

The most important adjustment was instructional delivery. Instead of uploading pre-recorded lectures to the server, I decided to host and record live sessions, via Zoom technology, as a way of maintaining interaction with our students. Research attests that a healthy learning environment is generated by establishing communication channels. I wanted to preserve the communication with my class during lectures as much as possible, though I knew it could diminish as the semester progressed due to ongoing circumstances. However, I was persistent in my approach. I kept showing up ten to fifteen minutes before class, as I normally did during classroom instruction, and talked with students who would connect early. I also sought participation from the students to mimic a classroom environment. Hosting live lectures also granted students an opportunity to inquire during the session and eliminated the need of creating additional Q&A platforms besides office hours, which were also hosted live via Zoom. However, I understood that attending a live session would be burdensome for several students because of the time-zone differences, so recording each session allowed them to view lectures at their convenience.

I also adjusted my class assignments. I decided to continue assigning homework each week, but significantly reduced the number of problems and granted flexibility in terms of submission (the same philosophy was adopted for exams). The reason I opted for this approach is that research demonstrates that negative effects such as anxiety and increased mental exertion are experienced due to grades, prolonged study hours, and financial hardships, which many our students have been experiencing during the COVID-19 pandemic. On top of this, many students do not have full access to various tools (e.g., laptop, internet, etc.) which are available on campus.

Although courses, pedagogies, and learning outcomes may differ across each discipline, I hope these simple tips can help my engineering colleagues navigate instructional challenges in this critical time.

#### From Diane Peters, Kettering University:

Because of our co-op program and the unusual academic calendar that we use, at the time we went into virtual learning I had two weeks left in the term. Fortunately, all of the most important material had been covered in my in-person class sessions, but there was still a final exam to handle. I turned most of it into auto-graded Blackboard questions, and made up a template for some of the problem solutions to make it easier for the students – I didn't want them to be stressing out over access to a printer and/or scanner at short notice.

There's a surprising amount that can be done with Blackboard questions – not just multiple choice, but also "hot spot" questions that can be used to identify points on a graph, or "ordering" questions that are effective for testing whether students can put the steps in a procedure in the proper order. And, of course, you can have questions with a numerical answer, with a tolerance assigned to cover roundoff error. When we're back on campus, I may use some of these kinds of questions to supplement in-class quizzes and tests, since they can be set up to give instant feedback.

#### **ASEE ME Division Awards**

The Division gives out two awards each year at the Annual Conference, the Outstanding New Mechanical Engineering Educator award and the Ralph Coates Roe Award. This year, the Outstanding New Mechanical Engineering Educator Award will be presented to Dr. Agnes d'Entremont of the University of British Columbia. The Ralph Coates Roe award will be presented to Dr. Grant Crawford of Quinnipiac University. We will also be presenting our division's Best Paper award during the conference. This year, the Best Paper award will be presented to a paper by Dr. Hope Weiss and Dr. John Sanders, titled "A Curriculum-Spanning Review Video Library to Improve Retention of Pre-requisite Course Material."

Since we will not be able to have the traditional social event at which these awards are presented, watch for information on how the virtual presentation will be structured, and make sure to "come see" the presentation of the awards! Also, you can watch the prerecorded presentation of our best paper, then join the virtual Q&A session to interact with the presenter.

#### Workshop at Annual Conference

Dr. Diane Peters, ME Division member, is holding a workshop at the ASEE Annual Conference. This free workshop, titled "Returning Graduate Students: Mentoring, Advising, and Teaching Graduate Students with Industry Experience," is intended for any faculty members who have, or wish to attract, graduate students who have worked in industry between their undergraduate and graduate degrees.

This workshop will provide information about the characteristics of these members, both demographic and in their skills and challenges. It will draw on research carried out on these students, and will focus on the ways in which faculty can draw on the strengths of these students. It will include both presentations of information and structured discussions of participants' own institutions and their graduate programs, with the goal of helping participants see ways in which they could better support returners' success and draw on their unique backgrounds to enhance the culture of their graduate community.

#### ASEE ME Division Executive Committee 2019-2020

Our division's current officers are:

Denver

Chair: Matthew Gordon, University of Denver Program Chair: Tom DeNucci, US Coast Guard Academy Program Chair-Elect: Rungun Nathan, Penn State University Secretary/Treasurer: Anna Howard, NC State Nominating Committee Chair: David Mikesell, Ohio Northern University Awards Selection Chair: Brian Novoselich, US Military Academy Newsletter Editor: Diane Peters, Kettering University Members at Large: Pavan Karra, Trine University; Nathan Washuta, The Citadel; Maryam Darbeheshti, UC

#### Notes from the editor

**Newsletter Contributions.** I am always looking for great articles for this newsletter, similar in style and length to the type you see within this edition. Feel free to submit great articles anytime even though the newsletter is produced only in the fall and spring. Just email your articles directly to me or any of the Division officers (listed on page 6). The ME Division website is also a good place to find current events and lists of important contacts and dates. If you have details you would like the entire division to see, send them to me as well.

The division website location is the same as you have previously seen: <u>http://mechanical.asee.org/</u>. Watch for upcoming updates to the website. We look forward to serving the division and meeting your mechanical engineering educational needs.

# Online Teaching Tools Menu by Dan Baker and Sam Bechara

We designed this menu to lay out a series of options for online class components. We have prioritized tools that are freely available to all students/faculty at Colorado State University and added value with links, advantages, and disadvantages.

Lectures / Capture			
<b>Solution for</b> Record PowerPoint slideshow	<b>Description</b> Use computer + microphone + <u>PowerPoint</u> <u>narration tools</u> to produce either (a) an MP4 video which I would recommend upload to YouTube / <u>Echo360</u> to share or (b) a PowerPoint slide show with narration (PPSX) which you could share via Canvas (upload to Canvas Files and link to in a <u>Canvas Module</u> ).	Advantages Could use these presentations for future supplemental or flipped use.	<b>Disadvantages</b> Note PPSX files can be large, limit slide show length to <10 minutes.
Record Multi- Material Lecture: Tech-savvy option	Use a touchscreen computer/tablet + stylus + microphone + software to write notes ( <u>OneNote</u> is free with your <u>CSU Microsoft 365</u> <u>account</u> ) + <u>Echo360 Universal Capture</u> to record anything on the screen (handwritten notes, PowerPoint, video, etc.). You can then <u>link the Echo360 videos directly into your</u> <u>Canvas course</u> .	You can record from anywhere. Could use these presentations for future supplemental or flipped use.	Need a tablet or touchscreen computer with note- taking software.
Record Multi- material Lecture: Low-tech option	Find <u>campus classroom</u> with a document camera + a microphone + use <u>Echo360</u> <u>Universal Capture</u> in one of the campus classrooms. Universal Capture records anything you project on the screen (handwritten notes, PowerPoint, video, etc.). You can then <u>link the Echo360 videos directly</u> into your Canvas course.	Echo350 team will record these for you if you set up a schedule with them	You need to go to a classroom to record.

## Online Homework – Grading and Submissions

Solution for	Description	Advantages	Disadvantages
Online Homework: Canvas Assignments	With <u>Canvas Assignments</u> you can create online homework assignments. To create an assignment: (1) upload assignment file to <u>Canvas Files</u> , then (2) add the file link in the assignment description, and (3) <u>set</u> <u>submission type</u> to 'online' and student can upload their work.	Uses available software to post and receive assignments. <u>Speedgrader</u> grading tool available to faculty and TA's.	Students must access/ use/ upload the file types you require. For example, for written work, students will need to scan & upload a PDF.
Online Homework: Assignments with LMS (Wiley+, McGraw Hill Connect, etc.)	Several textbooks have online learning management systems associated with the book. Contact your publisher representative to see if they have an LMS for your specific book.	You can easily assign automatically graded book problems. Some systems even allow you to assign reading.	It may be difficult or impossible to implement mid- semester. Will cost students more money.

## Office Hours and Interacting with Students

Solution for Faculty-to-student written communication: Canvas Announcements	<b>Description</b> With <u>Canvas Announcements</u> you can provide <u>direct links to all course content within an</u> <u>announcement</u> , which is not possible using the Canvas email tool. All course communication gets put in one place (as compared to email where students need to search for information).	Advantages Students can control how they receive announcements, including text messages. Allows replies, like a discussion forum.	<b>Disadvantages</b> Students control intervals and methods of receiving notification.
Student-to-faculty + student-to- student written communication: Canvas Discussions	<u>Canvas Discussions</u> is a flexible tool built into Canvas which can serve for general questions/ answers or assigned questions/ replies.	Participation can be assigned and graded. Students and faculty can subscribe to receive notifications of new posts in specific threads. Can reply from email if subscribed.	Students often perceive discussion forums as not engaging. External tools like <u>Slack</u> and <u>Piazza</u> have more features and are more natural to use.
Synchronous Audio + Video Communication: Canvas Conferences	<u>Canvas Conferences</u> provide a full-featured recordable meeting experience. Note that you will need to <u>enable Canvas Conferences in</u> your Canvas Menu if it is not currently showing.	Built into Canvas, making link and account management easy. Each conference has chat window, group notes page, a multi-user whiteboard, and you can upload any PDF presentation/file to view.	Screen sharing from participants seems to be limited to participants with a PC or Mac (tested limitation on an Android tablet, Android Phone, and iPhone). Separate conferences are required for each
Synchronous Audio + Video Communication: Microsoft Teams	Microsoft Teams has a broad range of features, which include the ability to set up and record meetings.	Robust meeting tool with a chat window, live captions, meeting notes, and multi-user screen sharing	Difficult to find meeting link: Set up a meeting in <u>Microsoft</u> <u>Teams</u> , once you invite at least one person, close the setup window, then reopen it and the meeting link from the description window can be copied via a

right mouse click.

Exams/Quizzes			
<b>Solution for</b> Problem-based Exams	<b>Description</b> Post exam as PDF to a Canvas Quiz question, use file upload problem type then grade with <u>Speedgrader</u>	Advantages Uses available software to post and receive an exam. A timed option is available.	<b>Disadvantages</b> Requires a student to upload assignments as DOC, DOCX, PPT, PPTX, or PDF files to be graded in <u>Speedgrader</u> . Proctoring currently uncertain.
Multiple-choice Exams	Program exam into <u>Canvas Quizzes</u>	Canvas will auto- grade many <u>question</u> <u>types</u> and allow you to grade others in <u>Speedgrader.</u>	Proctoring currently uncertain, check with CSU Testing Center for options.
Feedback and Stu	Ident Experience Support		

Solution for Ongoing anonymous feedback **Description** Use <u>Free Suggestion Box</u> for students to submit feedback.

## Advantages

Students unwilling to email can still provide feedback. Easy to post access link on Canvas Homepage.

### Disadvantages

Does not allow for follow-up due to anonymous nature

## Labs and Software Access

**Solution for** Off-campus software access Description ETS Virtual Classroom https://www.engr.colostate.edu/ets/virtualclassroom/

## Advantages

There supported clients for Windows, Mac, and Linux.

### Disadvantages

Requires the use of a secure VPN connection