Longitudinal Study

Note: Underlined text is a link to a Web resource, site or page

When teaching a course, instructors would like students to learn certain topics and demonstrate knowledge of these topics in a variety of ways. Instructors make choices in class activities and knowledge demonstrations to achieve learning outcomes. I've been regularly re-evaluating my choices to improve the learning environment. I've been using feedback from students, alumni, and peers. Some of those changes resulted in removing unnecessary stress that I was placing on students. Due to my participation in the Well-Being in Learning Environments Project since Spring 2018, I have been intentional about learning about and implementing ways to de-stress learning environments.

Here are examples of achieving learning outcomes while reducing unnecessary stress:

- **Have only one major deliverable due each week**. I've adjusted the course structure so that the midterm exams, homework assignments, and other major assignments occur at most once in a given week. This balanced weekly workload across the semester allows students to adhere to their weekly schedules and have time for the course. It removes the stress of having multiple major deliverables due in class the same week.
- **Allow students to drop the lowest grade in each assignment category.** This helps handle all kinds of unexpected situations that aren't covered by State Law (i.e. military orders or religious observance) or University policies (e.g. temporary or chronic disability including treatment for physical and mental health conditions). I automate drops via Canvas. I cannot drop a midterm exam because there are only two of them, but students drop the lowest homework assignment, lowest in-class assignment, etc. Students can also strategize the use of drops to fulfill other commitments.
- **Empower students to know their letter grade at any time.** I switched to an absolute 10-point grading scale that I convey in the first week and throughout the semester (90-100% A, 86.67-89.99% A-, 83.34-86.66 B+, 80.00-83.33 B, etc.) The scale applies to each test and assignment, and to the total numeric grade available any time on Canvas.
- **Encourage collaboration instead of competition.** Having an absolute grading scale allows students to help each other without any harm to their own grades. In addition, I invite students to work in teams of two on larger assignments (mini-projects and lab work). On homework, I encourage discussions and require that each student submit their own independent work. They take midterm and final exams individually.
- **Make midterm and final exams familiar.** Students use software tools on their laptops throughout the semester to learn concepts. I allow them to use their laptops (with all networking disabled) on midterm and final exams. They can preload all course materials (which I provide as a zip file) to their laptops, which they can search during the exam. I also provide blank copies and worked solutions for the exams in the previous nine semesters that I had taught the course. I ask questions on exams from discussions during in-class activities and from student knowledge demonstrations.
- **Added in-lecture activities.** Students apply concepts introduced earlier in the lecture period that are also on that week's homework assignment. It helps get started on the homework assignment, and also livens up the 75-minute lecture period.

I have learned much from student comments during coffee hours and on course instructor surveys, and made adjustments in style, content, and learning modalities. For all courses since fall 2017, I have sent a response to the survey comments to the students in the course. The following longitudinal analysis of pedagogical improvement and innovation is given first for EE 313 Linear Systems & Signals and later for EE 445S Real-Time Digital Signal Processing Laboratory. For a description of the content in these courses, please see the document Course Descriptions.

EE 313 Fall 2017 – Summary of Comments on Course Instructor Surveys

EE 313 Linear Systems & Signals has been required for both majors in our department since 1998. Please see the course info in Course Descriptions. From 1999-2016, I had taught the course seven times using a traditional ordering of topics. The traditional ordering is rooted in the early 1970s where student experiences in ham (amateur) radio equipment and other electronic hobbies made the students more comfortable with continuous-time concepts. This was at a time before the 1977 home computer, 1994 Web, and 2007 smart phone revolutions.

In recent years, I noticed our students were more comfortable with discrete-time concepts and operations than those in continuous time. Discrete-time concepts are part of a student's everyday life, including podcasts (playback of speech/audio), social media (posting and browsing of text, images and video) and videogames. Discrete-time operations involve counting and addition, whereas continuous-time operations involve more complicated intervals and integration. Since 2010, the ratio of students studying electrical vs. computer engineering has shifted from 2:1 to 1:2. This split roughly captures changes in emphasis from continuous time to discrete time.

In fall 2017, I reordered topics accordingly. I placed the material that students had seen in pre-requisite courses first, followed by discrete-time concepts and operations, and then continuous-time concepts and operations. Students used discrete-time concepts and operations to gain insight and intuition into concepts and operations in continuous time.

The class traditionally had two midterm exams, one final exam and weekly homeworks (except during a midterm exam week). I added two mini-projects in place of two homework assignments as well as low-stakes in-class work. Through mini-projects, students paired up for a deeper hands-on dive by developing a complete application. The in-class work, Tune-Up Tuesdays, provided students an opportunity to apply an idea that they had learned earlier that lecture, which in turn helped them on homework or mini-project assignments due Friday. I provided same-day feedback and grade. The addition of the mini-projects and in-class assignments had a side effect of reducing the weighting on the midterm and final exams, which reduced exam stress.

I tried to balance the weekly workload. I used *Signal Processing First* as the textbook, which has an updated companion Web site of demos and hundreds of worked problems.

Next are comments from the student course instructor surveys.

Fall 2017 Students Expressed Liking the Following
5 Available, attentive and helpful after lecture, in office hours, and by e-mail
2 Effective lectures … Concrete examples … In-lecture demos and notes on board
1 Great course, great professor … Great teacher. Hard subject.
1 Very helpful. I am repeating this course after dropping it last semester. Evans made a huge difference. … Professor very helpful … Helpful. Nice. Good professor.

1 Fairness in grading assignments … Reasonable workload … Best EE 313 class at UT

Fall 2017 Students Expressed Neutral Views
1 Homework was a lot different than lecture
1 "0/20" in lower right corner like I would do when grading a test with an empty answer
1 Would have liked to learn about hardware implementation of filters

Students Expressed Disliking the Following (with my responses are in parentheses)

- Homework was lengthy and grading (by the TA) was harsh
  (*Evans*: TA followed my rubric for all assignments and tests: 3/3 points for a correct approach in interpreting the question and correct answer; 2/3 points for a correct approach but computational mistakes beyond sign and transcription errors occurred; 1/3 points for an incorrect approach even if the computed solution is correct; 0/3 points for no work or repeating the question. Tests are adjusted by adding the same amount to each grade so that the highest grade is 100; assignments are not.)
- Late homework not accepted (*Evans:* In fall, I accepted assignments up to 30 minutes late without any penalties; no assignments were submitted later than that.)
- Homework drops? (*Evans*: Lowest homework grade and lowest in-class assignment grade were dropped automatically by the course Web platform, Canvas.)
- Homework due at 5pm is much better than 12:30pm
- Lecture – boring. Lecture – useless. Very little practical application/examples.
  (*Evans*: In lecture, I had given applications of the material to speech, audio, and image processing as well as communication systems. For Tune-up Tuesdays, students applied concepts to speech processing, audio processing and communication systems.)
- Not enough problems worked in lecture. (*Evans*: We worked a multi-part problem in each Tune-Up Tuesday. After each midterm, I worked through all midterm problems.)
- Give MATLAB mini-homeworks instead instead of Tune-Up Tuesdays.
- Open-book, open-note, open-laptop exam threw me off because I didn't know how to study/use the materials (*Evans*: My hope was to allow students to the same computer tools they had been using all semester long on a test, except that I cannot allow network access for the sake of academic integrity. I made available all midterm and final exams from the previous seven semesters so that student can practice taking those tests in the open-book, open-note, open-laptop format. Test questions came from homework, mini-project, and reading assignments; lecture discussion; and other sources. The multimedia companion for the textbook has hundreds of worked problems.)
- Can only complete homework assignments if I attend office hours
- Class content is a bit excessive if this isn't in your interest

Planned changes to the Fall 2018 Offering Based on Fall 2017 Student Comments

- I'll change the policy on late assignments from not accepting them to making them subject to a penalty of two points per minute late.
- I'll shift the due date/time for assignments on Friday from 12:30pm to 5:00pm
- I'll look for ways to make lecture more interesting by making more connections to the material in lecture that day (demos, current events, and research projects)
- I'll streamline the duration and scope of Tune-Up Tuesdays— fall 2017 was my first time to try in-lecture work for grade and feedback. I'll aim for a maximum of 15 min.

EE 313 Fall 2018 – Summary of Comments on Course Instructor Surveys

From : Brian Evans <halftoning@juno.com>
To : halftoning@juno.com
Cc : salimian.houshang@gmail.com
Subject : Thanks for your comments on the course instructor surveys
Date : Thu, Feb 07, 2019 05:06 PM

Dear Fall 2018 EE 313 Students,

I would like to thank you for a very enjoyable class in the fall.

Today, I went through all of the comments on your course instructor surveys, and I have responded to them below. As always, feel free to stop by on Fridays 12-2pm for my coffee hours in the O's café in the EER Building.

Thank you for your thank-yous for

- Being approachable and helpful … Caring and kind
- Effort and dedication … Going above and beyond … Helping us succeed
- Availability … Coffee hours … Office hours
- Teaching style … Explaining the material … Connections to real-life applications
- Depth of learning on mini-projects … Helpful homeworks … Quick feedback
- Canvas messages … Resources … Course zip file … Signal Processing First textbook

Thank you for all of your suggestions to improve the class. I'm planning to implement all of the following suggestions below the next time that I teach EE 313 in Fall 2020: *[Fall 2021]*

- Increase percentage of numerical grade for mini-projects
- Give two weeks to complete the mini-project
- Work more example/applied problems in lecture
- Assign homework over previous week's material
- Use marker board more and PowerPoint less
- Show more connections between discrete-time/continuous-time signals/systems
- Reduce the time that the in-lecture Tune-Up Tuesday assignments took
- Close the gap in Matlab knowledge to complete mini-projects

There were two additional suggestions.

One suggestion concerned dropping the lower of the two mini-project grades. I hadn't intended to do this until I faced unique circumstances that affected several students after miderm #2 had been submitted. Only three students had equal grades on the two mini-projects, so 69 of the 72 students earned a higher grade for the mini-project grade due to the drop. I realize that some of you might not have completed mini-project #2 if you had known in advance that the grade was going to be dropped. However, I didn't know in advance that I was going to drop the lower grade. And, I hope that you experienced valuable learning and growth through the mini-projects, and be sure to bring a copy of one of the mini-project reports with you on interviews.

The other suggestion was to give reviews before midterms #1 and #2. I had given a review for the final exam that was held outside of lecture hours. If I am not available to give reviews outside of lecture to give a midterm review, then I'd see if the TA would be available give the review.

Again, thanks for all of your comments on the course instructor surveys. Hope that you have a great semester. Please feel free to stop by during my coffee hours.

Regards,

Brian

Brian L. Evans, PhD, IEEE Fellow
Engineering Foundation Professor, UT Austin
http://users.ece.utexas.edu/~bevans/

EE 313 Fall 2021 – Summary of Comments on Course Instructor Surveys

From :   Brian Evans <bevans@ece.utexas.edu>
Cc   :   Firas Tabbara <firas.tabbara@utmail.utexas.edu>
Subject :   Thanks for your feedback on EE 313 Linear Systems & Signals
Date   :   Thu, Jan 13, 2022, 9:31 AM

Dear EE 313 Students,

Happy New Year! I hope that you've been able to rest and recharge over the winter break.

I really enjoyed learning and growing with you as engineers and scientists through EE 313 Linear Systems & Signals last semester.

Thank you for your feedback on the course. I summarize your feedback below on the course instructor surveys, along with my responses, after a couple of reflections on the course.

Reflections

My objectives for the course (from lecture #0 slides) were
- *Analysis*: Understand mathematical descriptions of signal processing algorithms
- *Synthesis*: Translate those algorithms into software simulations in MATLAB

During the first week of class, you expressed what you wanted from the course to include
- *Goals*: proficiency in Matlab; intuitive understanding of signals; learn more about applications; and describe signals by looking at them
- *Applications*: speech processing; image processing; 5G & 6G technologies; USB & PCI Express; automotive sensors (e.g. engine control); optical communications; and quantum computing.

Based on the course objectives and what you wanted from the course, I chose homework problems, created the two mini-projects on speech synthesis and wireless localization, and designed test questions.

Course Instructor Survey Comments

Thanks for taking the time to write comments on the course instructor surveys. Here's a quick summary of them:

Positive Comments
- Skills developed through the mini-projects
- Proficiency in Matlab

- Tune-up assignments for hands-on practice and help get started on homework that week
- Lectures were great for getting a good conceptual understanding .. and were well-prepared

Constructive Criticism

- Labs (mini-projects) were out of scope with rest of class
- Mini-project #2 made it difficult to see the connection between convolution and radar systems and was difficult to solve given what we had learned in class
- More coverage of continuous-time signals & systems
- Create a handout on frequency selectivity of filters
- Add more mathematics

Responses to the Course Instructor Survey Comments

The comments and criticisms are very helpful for future offerings of the course.

Each semester, I change the mini-projects based on student interests. Whereas Mini-Project #1 focused on human speech signals and their Fourier analysis connected to how we perceive auditory signals, Mini-Project #2 simulated a wireless ranging system using radar. Mini-Project #2 involved several topics not specifically covered in class such as matched filtering and time-bandwidth product, as well as those covered in class such as convolution, filtering and Fourier analysis. Mini-Project #2 had a higher workload than I would have liked, even after reducing the scope of the project. I agree with the criticism of Mini-Project #2 and will be more careful creating Mini-Projects next time I teach EE 313.

There is a balance in coverage between discrete-time and continuous-time systems in EE 313. In terms of lecture periods:

11 on Continuous-Time Signals & Systems
 9 on Discrete-Time Signals & Systems
 5 on Mixed-Signal Processing (sampling, aliasing, reconstruction)
 1 on Work Period for Mini-Project #2 on Wireless Localization

I would have liked to have spent two additional lectures on Laplace transforms including signal analysis and transfer functions. That's on me. However, Laplace transforms are a secondary topic compared to Fourier analysis, and I erred on the side of covering Fourier analysis in depth.

I agree with creating a handout on frequency selectivity of filters. Good idea.

In addition to choosing the balance in coverage between discrete-time and continuous-time signals and systems, the instructor also has to choose the balance between theory and implementation, or equivalently mathematical analysis and simulation. The two are mutually enriching and complementary; each gives insight to the other. I really want to provide a solid framework that is strengthened by connecting material to current applications and technology trends.

Best,
Brian

[Brian L. Evans](), PhD, IEEE Fellow | He/His/Him
Engineering Foundation Professor, UT Austin

EE 445S Fall 2017 – Summary of Comments on Course Instructor Surveys

I created the <u>Real-Time Digital Signal Processing Laboratory</u> course in 1997 to help students gain a deeper understanding of theory and algorithms for signals and systems as well as how to design and implement the algorithms in consumer products. I emphasize critical thinking in exploring design choices in signal quality vs. implementation cost. Applications include audio, image processing, biomedical and communication systems. Please see Part III Section 2 for a description of the course content.

The course has two midterm exams, weekly lab work, and homework assignments. The bulk of the hands-on learning occurs in homework assignments and weekly three-hour lab sections. Due to the synthesis of material in the weekly lab section, there isn't a final exam. To balance workload, there is only one major deliverable each week. The major deliverable is a midterm exam, a lab report, or homework assignment. This helps reduce stress in the learning environment. I train the TAs weekly. A new TA would attend all lectures.

<u>Liked</u>
2 Enjoyed the course. Great course!
2 Well organized. Great classroom/lecture management. Great in answering questions.
1 Professor engaged students with course content but also career and educational goals
1 Best professor I've had in EE. Lectures were clear. Professor new the material well.
1 Balanced workload week-to-week
1 Coffee hours were nice!

<u>Disliked</u>
2 Some lab instructions need to be rewritten, esp. to reflect the lab manual edition.
1 Lecture didn't start or end on time
1 Sometimes professor focused more on details instead of the big picture
1 Need better transition from EE 313 at the beginning of the semester
1 Content got significantly more difficult in second half of the semester
1 Lecture should have connected to lab more.
1 Turning in homework assignments and lab assignments on paper.

<u>Responses to Dislikes</u>
I have discussed this with the TAs; they will review and update all lab instructions
This semester, I've been starting lecture on time. I've been ending 2-3 minutes late. I'll fix that.
I'll try to focus more on the big picture. I'll give more motivation to topics being discussed.
The course spends the first four weeks reviewing EE 313 material.
I need to add a lecture for the transition from the first half on deterministic signals to the second half of the semester on random signals.
I've tried to connect lecture with lab.
Yes, I will switch to electronic submission of homework assignments and lab reports.

<u>Constructive Criticism on the TA Surveys</u>
• Improved on recitation timing over the semester, try not to exceed 30 mins
• Explanations are somewhat too technical or in depth

EE 445S Spring 2018 – Summary of Comments on Course Instructor Surveys

Based on the student comments from Fall 2017, I made several changes to the course. At the beginning of lecture, I spend about 10 minutes asking students to give me the three major takeaways from the previous lecture, also ask them if there are any questions and discuss them, and then show where we are in the flow of the semester.

Compliments
4 Well organized. Put a great deal of thought and care for this course. Very professional.
3 Professor cares so much. Always available to students and very knowledgeable.
2 Dr. Evans also did an excellent job of encouraging a warm and active class environment, and I always felt comfortable asking questions or commenting.
1 Great teacher, tries to give you all the tools needed to succeed.
1 Very friendly, also actively encourages growth for the student's careers after the class
1 Conversations would go to real world examples and how those functioned.
1 The one EE class I learned the most and had the most fun participating in.
1 This was the best class I have ever taken in ECE. The material was presented in a way that both made sense theoretically and is easy to transfer to actual implementation.
1 I struggled in the first of the course, and he went out of his way to ensure that I was able to catch up just in time to do well on the later material.

Request for Changes
2 Pre-lab quizzes were a little too detailed and tricky. Cover material in class first.
2 More example problem walkthroughs. Do some old test questions on the whiteboard.
1 Make homework submission online.
1 Lecture slides were a bit dense at times. Add comments. Break diagrams down a bit.
1 Instead of giving lab partners equal grades, evaluate their individual work somehow.
1 Lab instructions usually weren't clear and the lab textbook felt completely useless
1 More emphasis on additional reading material, beyond including it for the homework.

Other Concerns
1 A lot of material very quickly
1 Having homework solutions made me spend less time; without them, too much time
1 Just make sure the videos you will show us work beforehand next time.

Teaching Assistants
2 You picked excellent TAs. TAs did a very good job of assisting during lab.

EE 445S Fall 2018 – Summary of Comments on Course Instructor Surveys

I continued with the structure of 50-minute lectures on MWF and weekly three-hour lab sections. The TAs made another pass at updating and revising lab instructors and pre-lab quiz questions. I had adopted online graded pre-lab quizzes circa 2000 to encourage students to prepare for the lab work through reading assignments. If the students came to lab prepared, they could finish all of the lab work during the scheduled lab time and not need to come back at other hours. This helps students maintain their weekly schedules. Pre-lab quizzes are the only place that I use multiple choice questions in any of the courses that I teach. Midterms and assignments require students to show the intermediate steps in their critical thinking, which allows me to give them feedback to improve it.

Positive Comments

7 Lectures well organized / well prepared, with a clear curriculum plan

7 Thanks for a great course / wonderful semester / learned a lot

4 Instructor cares about the students, including their job searches and career plans

3 Enjoyed office hours & coffee hours

1 Helpful/thorough responses to questions in/outside of class (email or in person)

1 Really enjoyed lab #7 on guitar effects

1 Exam questions were ones you might see during a technical interview

1 Applications you showed in class helped me understand how concepts were used

Negative Observations

4 Buggy Code Composer Studio and DSP Board hindered lab work

1 PAM lab was tough and debugging biquads was difficult

1 Homework questions sometimes were very confusing.

Constructive Criticism

5 Cover more material in lecture before we use it in lecture and lab

2 Solve tough questions in class to help us apply concepts in the exam

1 Add more direct applications (more audio/image related homework problems)

1 Add more practical connections in lecture

1 Add answers to some of the questions on the PowerPoint slides

1 Update some of the later video recordings that are missing

1 Support Python simulation on homework (i.e. have Python version of JSK software)

1 Forgo homework reviews during lecture

1 Reduce amount of reading for some labs

1 Make lab instructions be clearer and more explicit

I had asked the TAs this semester to make sure that each lab team tests the DSP boards and Code Composer Studio software before using them. Ultimately, I'm on the lookout for an embedded processing board that has a good lab manual that uses it.

The Fall semester has four fewer class days than the Spring. For Fall 2018, I've been more careful this semester to make sure that material is introduced in lecture before it is used in homework and lab. I'll have to continue streamlining lecture material for the fall.

I've contacted the textbook authors about creating Python versions of their MATLAB code base, but they weren't planning to do that. I found several efforts and will reference them.

I agree that some homework reviews in lecture could be scaled back, but I'd like to make sure to answer any questions that arise during the review.

The TAs and I will review and update the reading assignments for each lab.   They will also continue to update lab instructions.

EE 445S Spring 2019 – Summary of Comments on Course Instructor Surveys

This semester, I switched lecture from 50-minute lectures on MWF to 75-minute lectures on MW due to heavy service commitments on Fridays. On Fridays, I participated in training through the Executive Management and Leadership Program at UT as part of my training to become Faculty Council Chair in 2019-20. Switching to 75-minute lectures would continue through 2019-20 because of heavy service days on Thursdays and Fridays due to various on-campus, system and state meetings due to being Faculty Council Chair.

To make a 75-minute lecture period more engaging, I introduced in-lecture assignments. I had implemented these in fall 2017 and fall 2018 in EE 313, as mentioned above. Students apply concepts learned earlier in the lecture period that would also help them to complete that week's homework assignment. Due to travel, I had pre-recorded four lectures so as to allow students to work for most of the lecture period on homework problems that had been assigned that week under the supervision of the TAs.

Due to not meeting for lecture on Fridays, I shifted to electronic submission for homework assignments on Fridays. Students had been asking for this option on the course instructor surveys in the previous three semesters instead of turning in hardcopies. I would still make a solution set available 30 minutes after the submission deadline, but in electronic format posted on Canvas. The grader would still return graded homework assignments by lecture on Monday, and would make comments on Canvas.   Due to the loss of Friday lecture, I swapped the flipped Fridays to discuss homework solutions to a flipped Monday.

Positive Comments
3 Instructor patient, helpful, and overall great. Great professor. Great course!
1 Helpful and thorough responses to questions in and outside of class (email or in person)
1 Advice and introduction to communication systems. Best advisor here at UT.
1 When he was out of town, he recorded lecture to make sure we stayed on track

Constructive Criticism
4 Pre-lab quizzes are quite different from what we do in lab. Emphasized random facts.
3 Spend less time going over homework solutions and takeaways in lecture.
1 Prefer in-person lectures to the lectures you recorded when you were out of town.
1 Spend more time on crucial concepts of modulation and interpolation in lecture
1 Organize course materials in a better way on website/Canvas
1 Spend more time programming in C in lab.
1 Have graduate TAs & undergraduate grader agree on solutions for homework problems

The TAs and I have been updating lab quizzes, reading assignments, and instructions.

I will scale back homework reviews in lecture.

I also prefer to be present in person when giving lectures instead of pre-recording them.

The TAs and I will spend more time on modulation and interpolation in lab / lecture.

I follow standard structure of materials on Canvas into modules, assignments, files, etc.

The lab manual asks students to modify the given baseline code to implement other algorithms. This approach is in line with work at a company or in research group.

I will make sure that a disconnect does not happen again between the TAs and grader.

EE 445S Fall 2019 – Summary of Comments on Course Instructor Surveys

This is my second semester of teaching lecture in 75-minute timeslots on MW due to heavy service commitments on Thursdays and Fridays as Faculty Council Chair.

Positive Comments
7 Prof. Evans understands students; always helps students in any way to increase student interest/understanding in the material while trying to reduce overall student stress.
5 Very enthusiastic instructor; inspires the class to take an active role in our learning
4 Not having homeworks and lab reports due same week was really helpful w/workload

2 The clear expectations and schedule at the beginning of the course are incredibly helpful
2 Lots of hands-on and real-world examples; going over homework in class really helped
1 Loved having previous lectures on demand [from Spring 2014 course]

Negative Observations
2 Prelab quizzes are very difficult; can be jarring since it's before we covered the content
2 Overloaded with information; not enough time to learn a topic before moving to next
1 Labs more task-driven than concept-driven
1 Lab boards are defective and unreliable

Constructive Criticism
3 Use less slides; hard to take notes; work more practice problems in class
1 Add page numbers to the Table of Contents for the course reader
1 Assign more "paper-and-pencil" homework questions and fewer simulation questions
1 Add old homework assignments to practice on

Teaching Assistants
1 Lab demonstrations
1 Labs are really good at solidifying theory concepts

The TAs and I continue to review, modify and add questions to the pre-lab quizzes.

I will review lecture and lab materials to remove less important and out-of-date info.

I will work with the TAs to add more concept-driven approaches in the lab sections.

Next semester will be the last semester that we use the lab boards.

I will reduce the number of slides and slow down the pace of lecture.

Homework simulation questions first require a fair amount of "paper-and-pencil" work.

All homework from spring 2014 is available with solutions and video explanations.

EE 445S Spring 2020 – Summary of Comments on Course Instructor Surveys

UT closed campus for in-person courses due to the pandemic from March 13th through the end of the semester. This caused a major shift because lecture and lab were in-person.

I continued projecting slides from my laptop in the same room over Zoom, and one of the TAs monitored the chat space. I used Zoom on my smart phone to focus on the marker board and I posted marker board pictures after lecture. I used the room's videoconferencing system to record lectures for asynchronous access, which was very reliable.

The TAs and I scrambled to switch all of the in-person hands-on lab work that had been based on using special-purpose boards to simulation lab assignments in MATLAB. The lab recitation would be on Zoom, and then the lab teams of two would work together over Zoom breakout rooms instead of working side-by-side at the same lab bench.

Spring Break was extended by one week to give instructional staff a little bit of time to adapt their course. During Spring Break, I reached out to all of the students to ask them about access to class resources, computers, and Internet, and gave them the option to switch lab sections. I also sent the students the Zoom guidelines from the Faculty Innovation Center, and posted an updated syllabus to reflect the changes in the course. I cancelled a two-week lab assignments and gave every student a grade of 100 for that lab.

For the course instructor survey, I opted for the COVID-19 version that asked students about their feedback before and after campus closed due to the pandemic.

Before Online Transition

Positive Comments

4 Prof. Evans always available after class to help with learning and anything else

1 Dr. Evans is truly the gold-standard for professors. He understands students.   Emphasis on mental health and his open conversation about mental health. Fine-tuning of course.

1 Balanced weekly workload

1 An excellently organized and executed course. Very useful and interesting content.

Constructive Criticism

2 Replace defective and unreliable lab boards

1 Assign more "paper-and-pencil" homework questions and fewer simulation questions

1 Add more information to slides for lab 1 recitation and instructions

After Online Transition

Positive Comments

3 Smooth transition; lectures recorded; all resources available; encouraged participation

1 Professor very considerate and awesome; course was great before and after transition

1 He put in effort to keep same learning experience while prioritizing our mental health.

1 Zoom lectures not a problem because Dr. Evans made good use of camera/whiteboard

1 The textbook was really helpful for self-study

Constructive Criticism

2 Felt more compelled to attend, and got more out of, lecture before switch to online

1 He could have stayed home to give his lectures using an iPad to be more safe

EE 445S Spring 2022 – Summary of Comments on Course Instructor Surveys

This was the second semester of in-person lab sessions during the pandemic. In Fall 2021, based on student feedback about the aging development boards in use prior to March 2020, we adopted the ARM-based STM32H735G Discovery Kit after TA Dan Jacobellis evaluated several candidate boards. In 2020-21, the lab was virtual using MATLAB due to the pandemic.

This semester, lecture was available live in person and online through the classroom's videoconferencing system. Lectures were recorded for later playback.

The survey comments are given after the proposed changes to the course in fall 2022.

1. Change lecture in response to "Near the end of class I start to drift off a little bit..."
    a. First 45 minutes of a deep dive into lecture slides + marker board
    b. Take a 5-minute break
    c. 25 minutes of larger context on the topic including demos, discussions, in-lecture work.
2. Additional demos
    a. Visualize baseband QAM transmission in the time domain using eye diagrams
    b. Play more videos on aliasing and the z-domain from DSP First
    c. Visualize correlation
3. Add upsampling and downsampling to lecture 4 on sampling & aliasing
4. Change lecture on Matched Filtering to be on PAM Receivers with receiver block diagram and coverage of adaptive systems (automatic gain control and Costas phase locked loops)

5. Move essential homework hints into the homework assignment.
6. Remove questions on pre-lab quizzes no longer relevant to updated lab assignments

Comments from the Spring 2022 course instructor survey...

Course content.
*   "jumped right in to the heavy stuff"
*   "compress the first few weeks' worth of [review] material slightly in order to spend extra time at the end of the semester on the really difficult concepts"
*   "first ECE class that made me feel like I was a capable electrical-engineer-to-be"
*   "The main difficulty I had was with the adaptive components … My suggestion is to present those in a more unified way, like how the JSK book does"
*   "The slide from lecture 15 (I believe) where the whole system block diagram was shown was very helpful, but I wish we encountered it earlier."

Course materials
*   "The numerous resources (OH, Coffee HRs, Numerous Test prep OH, Website, excellent TAs) all made me feel much more ready to tackle course content."
*   "more … visualizations for … Z plane, how phase translates to time delay, aliasing, QAM constellations … in time domain… correlating how signals look in time …"

Lectures
*   Incredibly helpful (x2)
*   "I also appreciate the breaks that we take in between lectures…"
*   "Near the end of class I start to drift off a little bit and … I wonder if a small summary of what we went over during lecture at the very end would help a bit."

Exams:
*   "I like that the exams were open notes so I could focus on really trying to understand the content instead of memorizing"

Web site
*   "I really like the fact that this course has its own website, where all of the lectures, labs, and additional material can be accessed."
*   "a bit disorganized but it's already a lot better than most professors …"

Labs
*   "prelab quizzes … some [questions] were even before the topics were covered in class"
*   "I felt like the labs were very organized and were somewhat challenging, however, I was able to finish all of them during my scheduled lab time."
*   "I loved the demos and the implementations in lab, tho I (personally) would love to be able to learn to develop some of the code in lab."

Homework assignments
*   "were too long, however, they were helpful in the learning process"
*   "Occasionally, there were additional questions asked in assignments that were present in the hints but not the question itself… lead to me missing points on one assignment"

Availability outside of lecture
*   "enjoyed coming to coffee hours every week and … meeting all of his former students"
*   "I appreciate the time that you take outside of lecture and during OH to clear up some questions and answer questions."

Workload
*   "do feel that while the workload was fairly constant from week to week, the difficulty of the material progressed rather quickly over the course of the semester"