

# ECEN 620: Network Theory: Broadband Circuit Design

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Fall 2023

Lecture: TR 2:20PM-3:35PM, ETB 1003

Distance Learning: Lecture video will be posted online TR at ~5:00PM

Course website (without videos): <https://people.engr.tamu.edu/spalermo/ecen620.html>

**Instructor:** Sam Palermo

**Office:** 315-E WERC

**Office Hours:** MW 1:30PM-3:00PM, In-person and via Zoom

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**Pre/Co-requisite:** ECEN 474/704

**Textbook:** Class Notes and Technical Papers

## References:

1. *Phaselock Techniques*, F. Gardner, John Wiley & Sons, 2005.
2. *Design of Integrated Circuits for Optical Communications*, B. Razavi, McGraw-Hill, 2003.
3. *Phase-Locked Loops: Design, Simulation, & Applications*, R. Best, McGraw-Hill, 1997.
4. *Broadband Circuits for Optical Fiber Communication*, E. Sackinger, Wiley, 2005.
5. *Design of Analog CMOS Integrated Circuits*, B. Razavi, McGraw-Hill, 2001.

## Class Notes:

- Posted on the course website

**Objectives:** At the end of this course, students be able to

1. Understand broadband circuit design methodologies and key principles
2. Understand phase-locked loop system design for applications such as frequency synthesis and clock recovery.
3. Understand the design specifications and implementation details of phase-locked loops and clock and data recovery systems.
4. Understand the design specifications and implementation details of broadband amplifiers, such as limiting, transimpedance, and variable-gain amplifiers.

## Grading:

- **Exams** **50%**
  - Two Midterm Exams (25% each), No Final Exam
  - Closed book
  - One double sided 8.5x11 note sheet allowed
  - No make-up exams except for university excused absences
- **Homework** **25%**
  - You are encouraged to work together with your colleagues on the homework. However, each student must turn in an independent write-up via Canvas.
  - No late assignments will be graded
- **Final Project** **25%**
  - Report and PowerPoint presentation required
  - Turn in report and presentation files via Canvas

### Grading Policy\*:

Letter Grade	x = Your Average
A	$x \geq 90.00$
B	$89.99 \geq x \geq 80.00$
C	$79.99 \geq x \geq 70.00$
D	$69.99 \geq x \geq 60.00$
F	$59.99 \geq x$

\*This is the lowest grade that you are guaranteed for your raw average, x. Depending on the relative performance of the class, your grade **MAY** be adjusted higher.

### Outline & Preliminary Schedule\*

Topic	Week
I. Introduction and Linear Systems	Week 1-8
II. PLL System Analysis	
III. PLL Building Blocks	
<b>1<sup>st</sup> Exam</b>	<b>Oct 12</b>
IV. CDRs	Week 9-14
V. Broadband Amplifiers	
VI. Other Topics	
<b>2<sup>nd</sup> Exam</b>	<b>Nov. 30</b>
<b>Project Report Due</b>	<b>Dec. 4</b>
<b>Project Presentation</b>	<b>Dec. 12 (1:00PM – 3:00PM)</b>

\*Exam dates are approximate and subject to change with reasonable notice.

### Academic Integrity Statement and Policy

“An Aggie does not lie, cheat or steal, or tolerate those who do.”

“Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate one’s work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case” ([Section 20.1.2.3, Student Rule 20](#)).

You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities at [aggiehonor.tamu.edu](http://aggiehonor.tamu.edu).

### Americans with Disabilities Act (ADA) Policy

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact Disability Resources in the Student Services Building or at (979) 845-1637 or visit [disability.tamu.edu](http://disability.tamu.edu). Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

### Title IX and Statement on Limits to Confidentiality

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and stalking.

With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate assistants, student workers, etc.) are Mandatory Reporters and

must report to the Title IX Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see [University Rule 08.01.01.M1](#)):

- The incident is reasonably believed to be discrimination or harassment.
- The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention – including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, you will be able to control how the report is handled, including whether or not to pursue a formal investigation. The University's goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need.

Students wishing to discuss concerns in a confidential setting are encouraged to make an appointment with [Counseling and Psychological Services](#) (CAPS).

Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the University's [Title IX webpage](#).

### **Statement on Mental Health and Wellness**

Texas A&M University recognizes that mental health and wellness are critical factors that influence a student's academic success and overall wellbeing. Students are encouraged to engage in proper self-care by utilizing the resources and services available from Counseling & Psychological Services (CAPS). Students who need someone to talk to can call the TAMU Helpline (979-845-2700) from 4:00 p.m. to 8:00 a.m. weekdays and 24 hours on weekends. 24-hour emergency help is also available through the National Suicide Prevention Hotline (800-273-8255) or at [suicidepreventionlifeline.org](https://suicidepreventionlifeline.org).

## **Build the Hell Outta Broadband Circuits!**

