ELEN 622 (ESS)
ACTIVE NETWORK SYNTHESIS

Instructor: **Edgar Sánchez-Sinencio**
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Office Hours: Mon, Wed. 11:00-12:00

Fall 2017
Time: TR 2:20–3:35 PM
Location: ETB 1003

No single textbook is suggested. Use Ref [7] as a basic reference.

Notes: see our webpage under: http://www.ece.tamu.edu/~s-sanchez/

Reference:

[1] *Passive and Active Network Analysis and Synthesis*, A. Budak, Houghton Mifflin Co., Boston, 1974. A classical Book with solid basic principles.

[2] *MOS Switched-Capacitor and Continuous-Time Integrated Circuits and Systems*, R. Unbehauen and A. Cichocki, Springer-Verlag, Berlin, 1989. Good cover in particular on SC filters.

[3] *The Circuits and Filters: Handbook*, Editor-in-Chief Wai-Kai Chen, CRC Press, 1995. Good reference for a variety of related topics.

[4] *Analog Integrated Circuit Design*, David A. Johns, and Ken Martin, John Wiley & Sons, Inc., New York, 1997. Good practical discussion.

[5] *Design with Operational Amplifiers and Analog Integrated Circuits*, S. Franco, McGraw Hill, New York, 1998. Valuable for discrete component implementations.

[6] *Continuous-Time Active Filter Design*, T. Deliyanis, Y. Sun, and J. K. Fidler, 1999, CRC Press. Good discussion on Gm-C filters.

[7] *Design of Analog Filters*, R. Schaumann, Haiqiao Xiao and M. E. van Valkenburg, Oxford University Press, 2nd edition,2009. This book is an excellent reference.

[8] *Design of High Frequency Integrated Analogue Filters*, Y. Sun, IEE, London, 2002. Good cover of several continuous-time circuits.

[9] *IEEE Trans. on Circuits and Systems I & II and IEEE J. Solid-State Circuits*.

OBJECTIVES: To analyze, understand and synthesize integrated CMOS active-filters. In particular the design of functional filters for a host of practical applications, from very low frequency of less than 1Hz up to GHz range RF Filters. Several applications for data communication and medical will be discussed. To learn how to apply design trade-offs and to combine optimally theory, simulations and practice in filter designs.

Grading Policy

Partial Exam 1	25%
Partial Exam 2	25%
Final Project*	35%
Homework	10%
Quizzes	5%
	100%

Notes

1) No final exam will be given. Partial exams can be take-home or closed book (with only one page information possibly). Exams might be scheduled to be out of class.

2) There will be no make-up exams for individual cases, unless it is properly justified, e.g. medical or family emergency.

3) Quizzes will be given randomly without previous notice.

4) Homework is due at the beginning of the class on the due date. Late homework is not accepted.

5) Knowledge of using CADENCE, and SIMULINK (of MATLAB) is highly recommended.

*Written final report is due December 8, 2016 before noon. Hard copy and soft copy.

ELEN 622 TENTATIVE OUTLINE AND SCHEDULE
FALL 2017

DATE	SUBJECT	REMARKS	MATERIAL
Aug. 29, 31 & Sept 2	Into & evolution of Electronic devices and passive and active filters	Overall view of course, and Historical development	Notes
Sept.5,7 & 9	Second-Order Systems, Mason Rules and Two Integrator Filters	Properties of second-order systems plus how to obtain transfer function	Notes and [1] & [2]
Sept. 12, 14 &16	Tow Thomas Biquad and Non-Ideal Integrators	Discussion on Integrated Biquad Filters	References [2], [3], [7]
Sept. 19, 21 & 23	Filter approximation Magnitude And Phase	Trade-Offs of different approximations	Notes and References [4],[7]
Sept. 26, 28 & 30	Band-Pass based and Multi-Phase Oscillator. Adaptive Filters.	Power, area and noise considerations	Notes and Papers [3], [9]
Oct. 3, 5, & 7 *Exam 1(outside Scheduled Class time).*	Gm-C filter Fundamentals and Biquads and higher order cascade filters	High and Low Frequency Filters	Note and references [3], [6], [8]
Oct. 10, 12 & 14	Continuous-Time Leap-Frog Topologies	Low sensitivity structures	Notes and references [4], [7] [9]
Oct. 17, 19 & 21	Follow-The-Leader Filter Topologies	Trade-Off between Leap-Frog and Cascade	Notes, [2] &, [4]
Oct. 24, 26 & 28	Active –R & Active -C	Use GB as a design parameter	Papers [7], [9]
Oct 31, Nov. 2 & 4	Ring Oscillator Based Filters	A New Filter Design Approach	Papers [9]
Nov. 7, 9 & 11	Switched-R Filters	Z-Domain Mathematics	Notes and references [4]
Nov. 14, 16 & 18 *Exam 2 (outside Scheduled class time).*	Switched Capacitor Building Blocks	Design Trade-Offs	Notes and references, [2], [6]
Nov. 21, 23 (25 Thanksgiving)*	Examples of filter applications: Multi-Standard RX Baseband Filters	Details on Applications	Notes and references [8], Sec. XV
Nov. 28, 30 & Dec. 2	Other Examples Final Presentation 1	Recent results.	References and Notes [2], [6]
Dec. 5 (Last day of semester)	Final Project Presentation 2	PowerPoint oral presentations of Final projects.	

Final Written Project report due 7, before noon.

Official Final: December 12th 8:00 – 10:00AM

***** Thanksgiving, Nov. 23 & 24.

Americans with Disabilities Act (ADA) Policy Statement

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Services for Students with Disabilities, in Room 126 of the Koldus Building or call 845-1637.

Academic Integrity Statement

"An Aggie does not lie, cheat, or steal or tolerate those who do." Honor Council Rules and Procedures are on the web http://www.tamu.edu/aggiehonor