

ESE 375: Architectures for Digital Signal Processing

Spring 2020

Catalog Description:

This course covers various aspects of architectures in digital signal processing and multimedia data processing. The topics include iteration bound analysis, retiming the circuits, unfolding and folding the architectures, algorithmic and numerical strength reduction for low power and low complexity design, introduction to array processor architectures and CORDIC implementation.

Course Designation: Elective for Computer Engineering

Text Books: "VLSI Digital Signal Processing Systems: Design and Implementation," K. K. Parhi. Wiley and Sons, 1999.

Prerequisites: Prerequisite: ESE 205, ESE 280

Coordinator: **Sangjin Hong**

Goals: Introduce concepts in architectures for digital signal processing.

Course Learning Outcomes:

- ability to apply knowledge of mathematics, science and engineering
- an ability to identify, formulate, and solve engineering problems
- an ability to use techniques, skills, and modern engineering tools necessary for engineering practice

Topics Covered:

Week 1	Course Overview Dataflow Representation of Algorithm
Week 2	Pipelining and Parallel Processing Iteration Bound Analysis
Week 3	Iteration Bound Computation Retiming
Week 4	Retiming Algorithm
Week 5	Unfolding

Week 6	Folding
Week 7	CSD Representation
Week 8	Numerical Strength Reduction
Week 9	1-D Systolic Array
Week 10	2-D Systolic Array
Week 11	Fundamental Operations
Week 12	Elementary Functions
Week 13	Scaling and Round-off
Week 14	Reconfigurable Architecture for DSP

Class/laboratory Schedule: 3 lecture hours per week

Blackboard

You can access class information on-line at: <http://blackboard.stonybrook.edu>

For help see: <http://it.stonybrook.edu/services/blackboard>

For problems logging in, go to the helpdesk in the Main Library SINC Site or the Union SINC Site; you can also call: 631-632-9602 or e-mail: helpme@stonybrook.edu

ADA Statement (Americans with Disabilities Act)

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, 128 ECC Building (631) 632-6748. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information go to the following website: www.ehs.sunysb.edu and search Fire Safety and Evacuation and Disabilities.

Academic Honesty and Integrity

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Any suspected instance of academic dishonesty will be reported to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at www.stonybrook.edu/uaa/academicjudiciary.

Student Outcomes	% contribution
1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	40
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.	50
3. an ability to communicate effectively with a range of audiences.	
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.	
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.	10
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions.	
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	