Philadelphia University
Faculty of -Engineering
Department of Mechatronics
First semester, 2009/2010

Course Syllabus

Course Title: Digital Signal Processing Systems	**Course code:** 640580
Course Level: Fourth Year	**Course prerequisite:** Digital Control (640460)
Lecture Time: Sun, Tue, Thu (12:10 - 13:10)	**Credit hours:** 3

Academic Staff Specifics

Name	Rank	Office Number and Location	Office Hours	E-mail Address
Dr. Tarek Tutunji	Associate Prof.	(728) Faculty of Engineering	Sun,Tue,Thu (10-11, 1-2)	ttutunji@philadelphia.edu.jo

Course module description:

To cover important concepts in Digital Signal Processing with Applications to Mechatronics

Course module objectives:

To enable the students to:

Understand the basic Signal Processing concepts
Design and Analyze Analog Filters
Understand different DSP architectures
Design and Analyze Digital Filters
Run and Analyze DSP MATLAB Simulations
Understand TMS320 Implementation using C language
Understand Digital Signal Controllers and their Applications

Course/ module components:

Design and Analysis of Passive Filters
Design and Analysis of Active Filters
Introduction to DSP Systems
DSP Fundamentals
Implementation Considerations
Fixed Point vs. Floating Point DSP
FIR FILTERS
IIR FILTERS
Digital Signal Controllers
FFT and POWER SPECTRUM

- **Book (title , author (s), publisher, year of publication)**

Digital Signal Processing: Architecture, Implementations, and Applications by Sen M. Kuo and Woon-Seng Gan (Pearson Education International) 2005

- **Support material (s):** Lecture notes hard copy.
- **Study guide (s) (if applicable) : -------**
- **Homework and laboratory guide (s) if (applicable): -------**

Teaching methods:
Lectures by using white board to explain and illustrate schematics and drawings.
Power Point Presentations.
Practical examples and Applications.
MATLAB software.
Project.

Learning outcomes:

Upon completing this course, the students should be able to:

- Know and understand signal processing
- Cognitive skills (thinking and analysis).
  1- Design of DSP systems
  2- Design Analog and Digital Filters

* Communication skills (personal and academic).
  1- Work in a team environment during the course project.
  2- Participate in questions/answers during lectures.

* Practical and subject specific skills (Transferable Skills).
  1- Analyze Controllers.
  2- Design of DSP systems

Assessment instruments

- Exam I: One
- Exam II: One
- Project: One

- Final examination:

Allocation of Marks	
Assessment Instruments	**Mark**
First examination	20
Second examination	20
Final examination:	50
Project	10
Total	100

Documentation and academic honesty

- Documentation style (with illustrative examples)
  1- Questions and answers of previous examination.
  2- Students reports.

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Course/module academic calendar

week	Basic and support material to be covered	Homework/reports and their due dates
Oct 11	**Introduction**	
Oct 18	**Design and Analysis of Passive Filters**	
Oct 25	**Design and Analysis of Active Filters**: LP, HP, BP, and BR	
Nov 1	**Introduction to DSP Systems I**: Applications, Architectures, General S/W and H/W issues	
Nov 8	**Introduction to DSP Systems II:** Sampling and Quantization	
Nov 15	**DSP Fundamentals I**: Signals, Z-Transforms, and System Properties	
Nov 22	**DSP Fundamentals II**: Frequency Analysis, DFT/FFT, MATLAB Signal Processing Tool Box	**EXAM I**
Nov 29	**Implementation Considerations**: Data Representation, Programming Issues, and Real-Time Implementation.	
Dec 6	**Fixed Point vs. Floating Point DSP**, TMS320 Family: Architecture, Implementation	
Dec 13	**FIR Filters I**: Design & Implementation, MATLAB, FDA Toolbox	**PROJECT DUE**
Dec 20	**FIR Filters II**: Design & Implementation, TMS320	**EXAM II**

	Implementation using C	
Dec 27	**IIR Filters I**: Design & Implementation and Filter Structures	
Jan 3	**IIR Filters II**: MATLAB functions and TMS320 Implementation	
Jan 10	**Digital Signal Controllers:** C++ Controller algorithms using DSP	
Jan 17	Introduction to **FFT** and **Power Spectrum**	
Jan 24	**FINAL EXAM**	

Expected workload:

On average students need to spend 2 hours of study and preparation for each 50-minute lecture/tutorial.

Attendance policy:

Absence from lectures and/or tutorials shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college/faculty shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.

Module references

Books

1. Digital Signal Processing: Principles, Algorithms, and Applications
by Proakis and Manolakis. 3rd edition Prentice Hall 1996

2. Digital Control using Digital Signal Processing by Nekoogar & Moriarty Prentice Hall 1999

3. C Algorithms for Real-Time DSP by Paul Embree, Prentice Hall 1995

4. Electrical Circuits by J. Nilsson & S. Reidel. 6th edition Prentice Hall 2001