Course Codes: ELEC 5705

Course Title: Fundamentals of Data Converters

Pre-requisites or Co-requisite:
Electronics I & II or equivalent

Grading Scheme:

<table>
<thead>
<tr>
<th>Item</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Midterm (1st Week of Nov)</td>
<td>40%</td>
</tr>
<tr>
<td>Project</td>
<td>30%</td>
</tr>
<tr>
<td>Class participation and assignments</td>
<td>30%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
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Textbook:

1. **Principles of Data Conversion System Design** by Behzad Razavi

2. **Analog Integrated Circuit Design**
   by Ken Martin and David Johns
Week-by-week Description:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics / Assignments</th>
<th>Reading / Assignment</th>
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<tbody>
<tr>
<td>1</td>
<td>Fundamental concepts of ADCs and DACs: SNDR, SFDR, ENOB, Quantization noise etc.</td>
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| 2    | Nyquist rate data converters:  
|      | • Flash ADC  
|      | • SAR ADC |  |
| 3    | Nyquist rate data converters (cont.):  
|      | • Pipeline ADC  
|      | • Sub-ranging ADC |  |
| 4    | Oversampled data converters:  
|      | • 1st order delta sigma ADC  
|      | • Higher order delta sigma ADC |  |
| 5    | Design Example of ADCs:  
|      | • High resolution low speed ADC  
|      | • High speed, moderate resolution ADC |  |
| 6    | Components of ADCs: Sample and hold, Comparator, reference generation and clock generation. |  |
| 7    | Digital to Analog Converter (DAC):  
|      | • Current mode DAC.  
|      | • Voltage mode DAC.  
|      | • Capacitive DAC. | Mid term |
| 8    | Design study of 50+ GS/s 7-bit DACs |  |
| 9    | Recent trends in data converters: time/phase domain data converter |  |
| 10   | Characterization of ADCs and DACs |  |
| 11   | Time interleaved ADCs |  |
| 12   | Calibration of ADCs and DACs |  |
| 13   | Project Presentation |  |