<table>
<thead>
<tr>
<th>Course name</th>
<th>ECE 53800 Digital Signal Processing Applications</th>
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<tbody>
<tr>
<td>Credit and contact hours</td>
<td>(3 cr.) Class 3</td>
</tr>
<tr>
<td>Course coordinator’s name</td>
<td>Mohamed. El-Sharkawy</td>
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**Course information**

2014-16 IUPUI Campus Bulletin description:

ECE 53800 Digital Signal Processing I (3 cr.) P: ECE 30100 and ECE 30200 or Graduate Standing. Class 3. Theory and algorithms for processing of deterministic and stochastic signals. Topics include discrete signals, systems, transforms, linear filtering, fast Fourier transforms, nonlinear filtering, spectrum estimation, linear prediction, adaptive filtering, and array signal processing.

Prerequisites/ Co-Requisite

P: ECE 30100 and ECE 36200

Required, Elective, or Selected Elective:

EE Elective, CE Elective

**Goals for the course**

Upon successful completion of the course, students should be able to

1. Describe the architecture and addressing modes of digital signal processors. [a]
2. Apply mathematical transforms such as FFT and DFT to signal processing problems. [a, e]
3. Select the appropriate filter type for the application. [a]
4. Apply systems concepts such as sampling, aliasing, and reconstruction to signal processing problems. [a, e]
5. Design digital filters to manipulate discrete parameter signals using signal processing algorithms and techniques. [b, c]
6. Implement digital filters such as FIR, IIR, Subband, Multirate, and adaptive filters using high-speed processors. [k]

**List of topics to be covered**

1. Introduction to Digital Signal Processing and Digital Signal Processors.
2. Highlights of signals and systems, time and frequency domains.
4. Instruction Set.
5. Sampling effects, aliasing, reconstruction, discrete Fourier Transform.
7. Finite impulse response filters.
8. Infinite impulse response filters.
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<tr>
<td>10.</td>
<td>Subband Filters and Multirate Systems.</td>
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<td>11.</td>
<td>DSP Applications.</td>
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<td>12.</td>
<td>Exams (2.0 classes and final exam period)</td>
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**Laboratory Projects:**

1. Introduction to the digital signal processor and the application development system.
2. Introduction to the assembler and simulator packages.
3. Architecture and addressing modes.
4. Instruction set.
5. Introduction to digital signal processing systems.
10. Student projects. Two projects for Graduate students. These two projects are optional for undergraduate students.

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<thead>
<tr>
<th>Syllabi approved by</th>
<th>Mohamed, El-Sharkawy</th>
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<td>Date of approval</td>
<td>04/26/2016</td>
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