# Course Description – Winter Semester

<table>
<thead>
<tr>
<th><strong>Title</strong></th>
<th>Digital Signal Processing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Faculty</strong></td>
<td>Electrical Engineering</td>
</tr>
<tr>
<td><strong>Professor</strong></td>
<td>Prof. Dr. Carsten Roppel</td>
</tr>
<tr>
<td><strong>ECTS</strong></td>
<td>5</td>
</tr>
<tr>
<td><strong>Level</strong></td>
<td>Bachelor</td>
</tr>
<tr>
<td><strong>Requirements</strong></td>
<td>Basic knowledge in signals and systems and programming in C is recommended.</td>
</tr>
<tr>
<td><strong>Add. Information</strong></td>
<td>Lecture and laboratory experiments</td>
</tr>
</tbody>
</table>

## Content

1. **Introduction**
2. **DSP Development Tools**
3. **Sampling und Quantization**
   - Sampling Theorem
   - Sampling of Bandpass Signals
   - Quantization
   - ADC Parameters and Types
4. **Discrete-Time Signals and Systems**
   - Impulse Response and Convolution
   - Fourier-Transform of Discrete-Time Signals
   - Discrete Fourier-Transform (DFT)
   - The z-Transform
5. **Finite Impulse Response (FIR) Filters**
   - Structure of FIR Filters
   - Design Methods
   - Implementation of FIR Filters
6. **Infinite Impulse Response (IIR) Filters**
   - Structure of IIR Filters
   - Bilinear Transform
7. **Representation of Numbers and Quantization of Filter Coefficients**
8. **Sampling Rate Conversion**
   - Decimation
   - Interpolation