



UNIVERSITAS GADJAH MADA

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MODULE HANDBOOK

Module name	: Digital Signal Processing 2 (REG)
Module level, if applicable	: Undergraduate
Code, if applicable	: MII2322
Courses, if applicable	
Semester(s) in which the module is taught	
Person responsible for the module	: Agfianto Eko Putra, Dr., M.Si.
Lecturer(s)	: Agfianto Eko Putra, Dr., M.Si.
Language	: English
Relation to curriculum	: Elective Course
Teaching methods	: Student Centered Learning
Workload (incl. contact hours, self-study hours)	: 42 contact hours, 42 self-study hours
Credit points	: 3
Requirements according to the examination regulations	: Minimum lecture attendance is 75% (according to UGM regulations). Final grades are graded based on assignments (20%), midterms (40%), and final exams (40%).
Required and recommended prerequisites for joining the module	: Digital Signal Processing 2 (MII2322)
Learning outcomes and their corresponding PLOs	After completing this module, students are expected to: CO1. Explain and apply the concept of multirate signal processing methods (multirate signal processing) CO2. Solving problems using multirate signal processing methods as part of the solution. CO3. Explain and apply the concept of adaptive signal processing methods. CO4. Solving problems using adaptive signal processing methods as part of the solution. CO.5 Explain and apply the concepts of STFT and wavelet-based signal processing methods. CO6. Solving problems using signal processing methods based on STFT and wavelets as part of the solution.

	<table border="1"> <thead> <tr> <th colspan="2">PLO</th> <th>CO1</th> <th>CO2</th> <th>CO3</th> <th>CO4</th> <th>CO5</th> <th>CO6</th> </tr> </thead> <tbody> <tr> <td rowspan="5">Program Learning Outcome (PLO)</td> <td>PLO1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>PLO2</td> <td>√</td> <td></td> <td>√</td> <td></td> <td>√</td> <td></td> </tr> <tr> <td>PLO3</td> <td>√</td> <td></td> <td>√</td> <td></td> <td>√</td> <td></td> </tr> <tr> <td>PLO4</td> <td></td> <td>√</td> <td></td> <td>√</td> <td></td> <td>√</td> </tr> <tr> <td>PLO5</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	PLO		CO1	CO2	CO3	CO4	CO5	CO6	Program Learning Outcome (PLO)	PLO1							PLO2	√		√		√		PLO3	√		√		√		PLO4		√		√		√	PLO5						
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Content	<p>Multirate Signal Processing – Sampling Rate Converts</p> <ol style="list-style-type: none"> 1. Introduction/Motivation 2. Integer Sampling Rate Converters 3. Rational Sampling Rate Converters 4. Polyphase Filters 5. Narrowband Filters 6. Filter banks 7. Perfect Reconstruction Filter Banks 8. Transmultiplexors 9. GUI Modules and Case Studies <p>Adaptive Signal Processing – MSE and LMS Method</p> <ol style="list-style-type: none"> 1. Introduction/Motivation 2. Mean Square Error 3. Least Mean Square (LMS) Method 4. Performance Analysis for LMS Method 5. Modified LMS Method 6. Adaptive Filter Design with Pseudo-filters 7. Recursive Least Square (RLS) Method 8. GUI Modules and Case Studies <p>Wavelet-based Signal Processing – Introduction</p> <ol style="list-style-type: none"> 1. Preview of Wavelets, Wavelet Filters, and Wavelet Transforms 2. The Continuous Wavelet Transform (CWT) Step-by-Step 3. The Undecimated Discrete Wavelet Transform (UDWT) Step-by-Step 4. The Conventional (Decimated) DWT Step-by-Step 5. Comparison of the Major Types of Wavelet Transforms 6. Case Studies of Wavelet Applications 																																												
Study and examination requirements and examination forms																																													
Media employed	: slides, discussions, online or offline lectures																																												
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	Final exam	40				V	√
	Total	100					
Reading list	<p>[1] Schilling, R.J., and Harris, S.L, 2017, <i>Digital Signal Processing using MATLAB 3rd Edition</i>, Cengage Learning, USA.¹</p> <p>[2] Fugal, D.L., 2009, <i>Conceptual Wavelets in Digital Signal Processing: an In-depth Practical Approach for the Non-Mathematician</i>, Space & Signals Technologies LLC.²</p>						

Created date : January 15th, 2023

Revision date : January 15th, 2023

¹ Bab 8: Multirate Signal Processing dan Bab 9: Adaptive Signal Processing

² Bab 1: Preview Wavelet, Penulis Wavelet dan Transformasi Wavelet, Bab 2: The Continuous Wavelet Transform (CWT) Step-by-Step, Bab7: Comparison of the Major Types of Wavelet Transforms dan dan Bab 11: Studi Kasus Aplikasi Wavelet - www.ConceptualWavelets.com