



Heaven's light is our guide

Rajshahi University of Engineering & Technology

MTE 1101

Mechatronic Systems

Prepared By:

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12-Mar-22

Outlines

- Syllabus.
- Recommended Books.
- Course Teachers.
- Weekly Routine.
- Grading System
- Course Registration Form.
- Join your google classroom.

Syllabus

MTE 1101 (Mechatronic Systems)

Lecture: 3 hrs. /week

Introduction: Definitions of Mechatronics, Overview of different Mechatronic systems, Scope and applications of Mechatronics.

Sensors and transducers: Basic principles of potentiometer, op-amps, Wheatstone bridge, introduction to sensors and transducers, sensor characteristics, classification of sensors, proximity sensors.

System Modeling and Control: Introduction to signals and systems, Modeling of Mechanical, Electrical, Fluid systems, Linearization of nonlinear systems, Rotational-translational systems, Electro-Mechanical systems and Hydraulic-Mechanical systems, components of Control system, Types of control system, System representation, System responses, Time constant, Rise time, Settling time, Steady state error, Performance, Transfer function, Block diagram and Illustrative examples.

Actuation systems: Linear and rotary actuators. AC and DC motors, Solenoids, Stepper motor, Fluid power actuators and Pneumatic actuators.

Recent trends in Mechatronic systems.

Recommended Books

Textbook:

1. Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering by **W. Bolton**. [

Reference Books:

1. A Textbook of Mechatronics by **RK Rajput**. [[pdf](#)]
2. Mechatronics: An Integrated Approach by Clarence W. De Silva. [[pdf](#)]

Course Teachers

- **Prangon Das**, Lecturer Dept of MTE, RUET: **Section A: Introduction, Sensors and transducers**, Recent trends in Mechatronic systems.
- **Subrata Kumar Sarker**, Lecturer, Dept of MTE, RUET: **Section B: System Modeling and Control**

Weekly Routine

Day	Saturday							Sunday											
	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	4
16 Series AICSL	CSE 4281 MHA	MTE 4209(a) MRZ	MTE 4203 SKD				MTE 4206 FRB/MRI (RAL)			CSE 4281 MMH/MHA	MTE 4207 SKS	MTE 4209(a) MRZ							MTE SH
17 Series R-405				ME 3265 PD	MTE 3205 SHA	ME 3255 FRB				ME 3265 PD	ME 3287 MMH	ME 3255 MRI	ME 3265 PD/MHA	ME 3256 MRZ (ML)	EEE 3287 MMI	MTE 3201 ZT	MTE 3205 SHA/SKD		MTE PDM
18 Series R-404		ME 3156 MZS (NL)		Math 3127 MBH	MTE 3155 FRB	MTE 3101 SKS	MTE 3104 PD/MMI (CSL)			MTE 3155 MRI	MTE 3101 ZT	MTE 3105 SHA/MHA		MTE 3104 PD/MMI (CSL)					
19 Series R-404	ME 2155 MR/UPD	CSE 2187 FRB	EEE 2187 MFA		EEE 2188 MEA/MMI (RAL)					EEE 2188 MMU/MFA (RAL)	Math 2127 MSA	Hum 2127 ABS			CSE 2187 MMH	EEE 2187 MFA/MMI	ME 2155 MRI		
20 Series R-405	MTE 1101 SKS /PPD	Hum 1127 MGM	Phy 1127 MRA		ME 1130 MRI (CSL)					Math 1127 MAA	Chem 1127 TKP	MTE 1101 PD		ME 1130 MRI (R- 405)		MTE 1102 PDISKS (CSL)			Phy 1 MR
<div>Teacher's Name SKD: Dr. Sajal Kumar Das MFA: Md. Firoj Ali ZT: Zinat Tasneem MRI: Md. Manirul Islam FRB: Faisal Rahman Badal MHA: Md. Hafiz Ahamed SHA: Sarafat Hussain Abbi SKS: Subrata Kumar Sarkar PD: Prangon Das MMH: Md. Mehedi Hasan</div>																			
Day	Tuesday							Wednesday											
	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	
16 Series AICSL		MTE 4200		MTE 4205 MRI	MTE 4203 SKS/SHA	CSE 4281 MMH	MTE 4210			MTE 4205 PD/SHA (CSL)	MTE 4205 FRB/MRI	MTE 4207 PD/SKS	MTE 4209(a) MRZ						
17 Series R-405				EEE 3287 MMU/MMH	ME 3265 MHA	MTE 3201 SKS					MTE 3201 ZT/SKS	MTE 3205 SKD	ME 3255 MRJ/FRB	MTE 3200					
18 Series R-404				MTE 3103 PD	Math 3127 MMI	MTE 3155 MRJ/FRB					MTE 3103 MMH	MTE 3105 SHA	Math 3127 MMU/MBH	MTE 3102 SKS/FRB (R- 404)					
19 Series R-404	Hum 2127 MNP	CSE 2187 MMH/FRB	Math 2127 MSA		ME 2156 MMK (NL)					Hum 2127 MNP	MATH 2127 MZA	EEE 2187 MMI		MTE 2130 MRI (CSL)					
20 Series R-405	Hum 1127 MGM	Math 1127 MN	Phy 1127 MSP							MTE 1101 SKS	Chem 1127 TKP	Math 1127 MAA	Phy 1128 MNZ/ MJ						
<div>Name of the Laboratories: CSL: Computer & Simulation Lab AICSL: Artificial Intelligence & Control System Lab RAL: Robotics & Automation Lab ML: Metrology Lab</div>																			

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MTE 1101: Mechatronic Systems

Prangon Das, Lecturer, Dept. of MTE, RUET

Grading System

Numerical grade	Letter grade	Grade point
80% or above	A+ (A Plus)	4.0
75% to less than 80%	A (A Regular)	3.75
70% to less than 75%	A- (A Minus)	3.5
65% to less than 70%	B+ (B Plus)	3.25
60% to less than 65%	B (B Regular)	3.0
55% to less than 60%	B- (B Minus)	2.75
50% to less than 55%	C+ (C Plus)	2.5
45% to less than 50%	C (C Regular)	2.25
40% to less than 45%	D	2.0
Less than 40%	F	0
Incomplete	I	-
Need to register again	--	-

The distribution of marks for a given course follows:

Theory courses:

- Class participation and attendance
- Class tests
- Assignment/Group work/Case study
- /Oral presentation/Project design

❖ Semester Final Examination

Total

=

Subject to the approval of academic council

Sample Question

Heaven's Light is Our Guide
Rajshahi University of Engineering & Technology
Department of Mechatronics Engineering
B.Sc. Engineering 4th Year ODD Semester Examination 2017
Course Title: Digital Signal Processing & Machine Vision
Time: Three Hours
Course No: MTE 4103
Full Marks: 72

- N.B. i) Answer any Six questions, taking Three from each section.
ii) Figures in the margin indicate full marks.
iii) Use separate answer script for each section.

SECTION-A

- Q.1(a) What do you know by digital signal processing? What are the relative advantages and disadvantages of digital signal processing over analog signal processing? 04
(b) Draw the basic diagram of a typical DSP system. Explain the functions of each block. 04
(c) Using basic blocks included by DSP, sketch the block diagram representation of discrete time system described by the input-output relation. 04

$$y(n) = \frac{1}{2}y(n-1) + \frac{1}{2}x(n) + \frac{1}{4}x(n-1)$$

where $x(n)$ is the input and $y(n)$ is the output of the system.

- Q.2(a) Define Z-Transform. State and explain time reversal property of Z transform. 04
(b) Determine the Z-transform of the signal 04
 $x(n) = a^n u(n) = \{a^0, a^1, a^2, \dots\}$
(c) State and explain the Linearity and time reversal property of DFT. 04

- Q.3(a) Define Convolution and De-convolution operation in DSP. Write some applications of convolution in DSP. 04
(b) What is auto correlation function? Discuss the auto correlation function for energy signal and power signal. 04

- (c) Determine the autocorrelation sequence $r_{xx}(k)$ of the sequences. 04
 $x(n) = \{1, 0, 0, 2, -1, 3, 7, 1, 2, -3, 0, 0, \dots\}$
 $y(n) = \{1, 0, 0, 1, -1, 2, -2, 4, 1, -2, 5, 0, 0, \dots\}$

- Q.4(a) What do you know about digital filtering? What are the applications of digital filter? 03
(b) Define FIR system. Discuss the FIR system for any structure. 04
(c) Describe the design method of Linear phase FIR filter using windows method. 05

SECTION-B

- Q.5(a) What do you mean by Machine Vision? Describe the machine vision system operation by a four step flow. 04
(b) Define digital image processing. Write down the advantages and disadvantages of digital image processing. 04
(c) Name some image acquisition (vision) sensors. Explain any one type of vision sensor. 04

- Q.6(a) Draw the block diagram of a typical image analysis system and explain functions of each block. 04
(b) How image can be enhanced? Explain histogram modeling for image enhancement. 04
(c) What are image transforms? Why these transforms are needed? 04

- Q.7(a) What is feature extraction? How it is helpful in machine vision? 04
(b) Explain the flow chart of Canny Edge detector. What advantages are offered by this detector? 04
(c) How images are coded? What are the factors which need to be considered when coding images? 04

- Q.8(a) What is object recognition? Why it is so difficult in machine vision task? 04
(b) What are the three main issues of object recognition? Give an example of how object can be categorized? 04
(c) What is machine learning? How it is helpful to recognize objects? 04

Course Registration Form

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RAJSHAHI UNIVERSITY OF ENGINEERING & TECHNOLOGY, BANGLADESH

Course Registration/Course Adjustment Form

.....**Department.**

Roll No:.....Registration No. with Session:.....

Name:

Academic session with Semester:..... Previously earned credit:.....

Course No. of Backlog Courses

Courses to be registered in this semester:

Course No.	Course Title	Credit
Total credit of this Semester		

Adviser's Comments (if any).....

Signature of the Student

Signature of the Adviser

Signature of the Controller

Date:

Students are asked to cross out irrelevant Terms.

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Join Your Google Classroom

- Must open a gmail account.
- Gmail account name should be: Name.Roll.ruet.mte@gmail.com ex: fahim.2008001.ruet.mte@gmail.com
- Go to <https://classroom.google.com/>
- Click + icon at the upper right corner
- Join Class
- Class Code: **zpbrhyt**
- Class Link: <https://classroom.google.com/c/NDc4MzEzNDY3Nzk4?cjc=zpbrhyt>

To Be Continued.....

THANK YOU