### Semester-I (First Year First Semester)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>RME 1101</td>
<td>Fundamentals of Mechanical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>RME 1102</td>
<td>Fundamentals of Computing</td>
<td>3</td>
</tr>
<tr>
<td>RME 1103</td>
<td>Differential and Integral Calculus</td>
<td>3</td>
</tr>
<tr>
<td>RME 1104</td>
<td>Physics</td>
<td>3</td>
</tr>
<tr>
<td>RME 1105</td>
<td>Chemistry</td>
<td>3</td>
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</tbody>
</table>

**Theory Courses**

**Total Credits:** 21

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>RME 1114</td>
<td>Physics Lab</td>
<td>1.5</td>
</tr>
<tr>
<td>RME 1115</td>
<td>Chemistry Lab</td>
<td>1.5</td>
</tr>
<tr>
<td>RME 1116</td>
<td>Engineering Drawing Lab</td>
<td>1.5</td>
</tr>
<tr>
<td>RME 1117</td>
<td>Machine Shop and Workshop Practices Lab</td>
<td>1.5</td>
</tr>
</tbody>
</table>

**Lab Courses**

**Total Credits:** 21.5

### Semester-II (First Year Second Semester)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>RME 1201</td>
<td>Fundamentals of Mechatronics Engineering</td>
<td>3</td>
</tr>
<tr>
<td>RME 1202</td>
<td>Fundamentals of Electrical and Electronics Engineering</td>
<td>3</td>
</tr>
<tr>
<td>RME 1203</td>
<td>Fundamentals of Programming</td>
<td>3</td>
</tr>
<tr>
<td>RME 1204</td>
<td>Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>RME 1205</td>
<td>Accounting</td>
<td>3</td>
</tr>
<tr>
<td>RME 1206</td>
<td>Functional English</td>
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**Theory Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>RME 1211</td>
<td>Fundamentals of Mechatronics Engineering Lab</td>
<td>1.5</td>
</tr>
<tr>
<td>RME 1212</td>
<td>Fundamentals of Electrical and Electronics Engineering Lab</td>
<td>1.5</td>
</tr>
<tr>
<td>RME 1213</td>
<td>Fundamentals of Programming Lab</td>
<td>1.5</td>
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</table>

**Lab Courses**

**Total Credits:** 21.5
### Semester-III (Second Year First Semester)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>RME 2101</td>
<td>Instrumentation and Measurement</td>
<td>3</td>
</tr>
<tr>
<td>RME 2102</td>
<td>Digital Logic Circuit and Microprocessor</td>
<td>3</td>
</tr>
<tr>
<td>RME 2103</td>
<td>Engineering Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>RME 2104</td>
<td>Multivariate and Vector Calculus</td>
<td>3</td>
</tr>
<tr>
<td>RME 2105</td>
<td>Managerial and Engineering Economics</td>
<td>3</td>
</tr>
<tr>
<td>RME 2106</td>
<td>Society and Technology</td>
<td>3</td>
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#### Theory Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hour</th>
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<tbody>
<tr>
<td>RME 2111</td>
<td>Instrumentation and measurement Lab</td>
<td>1.5</td>
</tr>
<tr>
<td>RME 2112</td>
<td>Digital Logic Circuit and Microprocessor Lab</td>
<td>1.5</td>
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</table>

**Total Credits: 21**

### Semester-IV (Second Year Second Semester)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>RME 2201</td>
<td>Introduction to Robotics</td>
<td>3</td>
</tr>
<tr>
<td>RME 2202</td>
<td>Microcontroller and Programmable Logic Controller</td>
<td>3</td>
</tr>
<tr>
<td>RME 2203</td>
<td>Object Oriented Programming</td>
<td>3</td>
</tr>
<tr>
<td>RME 2204</td>
<td>Electrical Machines</td>
<td>3</td>
</tr>
<tr>
<td>RME 2205</td>
<td>Differential Equations and Coordinate Geometry</td>
<td>3</td>
</tr>
<tr>
<td>RME 2206</td>
<td>Statistics for Engineers</td>
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#### Theory Courses

<table>
<thead>
<tr>
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<th>Course Title</th>
<th>Credit Hour</th>
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</thead>
<tbody>
<tr>
<td>RME 2211</td>
<td>Introduction to Robotics Lab</td>
<td>1.5</td>
</tr>
<tr>
<td>RME 2212</td>
<td>Microcontroller and Programmable Logic Controller Lab</td>
<td>1.5</td>
</tr>
<tr>
<td>RME 2213</td>
<td>Object Oriented Programming Lab</td>
<td>1.5</td>
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**Total Credits: 22.5**
### Semester-V (Third Year First Semester)

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td><strong>Theory Courses</strong></td>
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</tr>
<tr>
<td>RME 3101</td>
<td>Artificial Intelligence</td>
<td>3</td>
</tr>
<tr>
<td>RME 3102</td>
<td>Advanced Mechatronics Engineering</td>
<td>3</td>
</tr>
<tr>
<td>RME 3103</td>
<td>Mechanics of Solids and Fluids</td>
<td>3</td>
</tr>
<tr>
<td>RME 3104</td>
<td>Mathematical Analysis for Engineers</td>
<td>3</td>
</tr>
<tr>
<td>RME 3105</td>
<td>Industrial Management</td>
<td>3</td>
</tr>
<tr>
<td><strong>Lab Courses</strong></td>
<td></td>
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</tr>
<tr>
<td>RME 3111</td>
<td>Artificial Intelligence Lab</td>
<td>1.5</td>
</tr>
<tr>
<td>RME 3112</td>
<td>Advanced Mechatronics Engineering Lab</td>
<td>1.5</td>
</tr>
<tr>
<td>RME 3113</td>
<td>Mechanics of Solids and Fluids Lab</td>
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<tr>
<td><strong>Total Credits:</strong></td>
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### Semester-VI (Third Year Second Semester)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hour</th>
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<tbody>
<tr>
<td><strong>Theory Courses</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RME 3201</td>
<td>Intelligent Systems and Robotics</td>
<td>3</td>
</tr>
<tr>
<td>RME 3202</td>
<td>Manufacturing Process with CNC Programming</td>
<td>3</td>
</tr>
<tr>
<td>RME 3203</td>
<td>Power Electronics and Drives</td>
<td>3</td>
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<tr>
<td>RME 3204</td>
<td>Control Systems Design</td>
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<tr>
<td>RME 3205</td>
<td>Bangladesh Studies</td>
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<tr>
<td><strong>Lab Courses</strong></td>
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<tr>
<td>RME 3211</td>
<td>Intelligent Systems and Robotics Lab</td>
<td>1.5</td>
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<tr>
<td>RME 3212</td>
<td>Manufacturing Process with CNC Programming</td>
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<tr>
<td>RME 3213</td>
<td>Power Electronics and Drives Lab</td>
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<tr>
<td><strong>Total Credits:</strong></td>
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### Semester-VII (Fourth Year First Semester)

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td><strong>Theory Courses</strong></td>
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</tr>
<tr>
<td>RME 4101</td>
<td>Advanced Robotics</td>
<td>3</td>
</tr>
<tr>
<td>RME 4102</td>
<td>Digital Image Processing and Robot Vision</td>
<td>3</td>
</tr>
<tr>
<td>RME 4103</td>
<td>Digital Signal Processing</td>
<td>3</td>
</tr>
<tr>
<td>RME 4104</td>
<td>Mechanical Power Transmission Systems</td>
<td>3</td>
</tr>
<tr>
<td><strong>Lab Courses</strong></td>
<td></td>
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</tr>
<tr>
<td>RME 4111</td>
<td>Advanced Robotics Lab</td>
<td>1.5</td>
</tr>
<tr>
<td>RME 4112</td>
<td>Digital Image Processing and Robot Vision Lab</td>
<td>1.5</td>
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<tr>
<td>RME 4113</td>
<td>Digital Signal Processing Lab</td>
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<tr>
<td>RME 4115</td>
<td>Research Methodology, Technical and Scientific Writing Lab</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Project Work</strong></td>
<td></td>
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<tr>
<td>RME 4100</td>
<td>Project</td>
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<td><strong>Total Credits:</strong></td>
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### Semester-VIII (Fourth Year Second Semester)

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td><strong>Theory Courses</strong></td>
<td></td>
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</tr>
<tr>
<td>RME 4201</td>
<td>Human Robot Interaction</td>
<td>3</td>
</tr>
<tr>
<td>RME 422x</td>
<td>Optional Course I (From Group A)</td>
<td>3</td>
</tr>
<tr>
<td>RME 422x</td>
<td>Optional Course II (From Group B)</td>
<td>3</td>
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<tr>
<td><strong>Lab Courses</strong></td>
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<tr>
<td>RME 4211</td>
<td>Human Robot Interaction Lab</td>
<td>1.5</td>
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<tr>
<td>RME 423x</td>
<td>Optional Course I Lab (From Group A)</td>
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<tr>
<td><strong>Project Work</strong></td>
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<tr>
<td>RME 4200</td>
<td>Project</td>
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<td><strong>Total Credits:</strong></td>
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## List of Optional Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hour</th>
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<tbody>
<tr>
<td>RME 4221</td>
<td>Introduction to Machine Learning</td>
<td>3</td>
</tr>
<tr>
<td>RME 4222</td>
<td>Introduction to Biomedical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>RME 4223</td>
<td>Mobile Robotics</td>
<td>3</td>
</tr>
<tr>
<td>RME 4224</td>
<td>Simulation and Modeling</td>
<td>3</td>
</tr>
<tr>
<td>RME 4231</td>
<td>Introduction to Machine Learning Lab</td>
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<tr>
<td>RME 4232</td>
<td>Introduction to Biomedical Engineering Lab</td>
<td>1.5</td>
</tr>
<tr>
<td>RME 4233</td>
<td>Mobile Robotics Lab</td>
<td>1.5</td>
</tr>
<tr>
<td>RME 4234</td>
<td>Simulation and Modeling Lab</td>
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### Group - B

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hour</th>
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<tbody>
<tr>
<td>RME 4225</td>
<td>Material Science and Engineering</td>
<td>3</td>
</tr>
<tr>
<td>RME 4226</td>
<td>Machine Design and System Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>RME 4227</td>
<td>Introduction to Nanoscience and Nanotechnology</td>
<td>3</td>
</tr>
<tr>
<td>RME 4228</td>
<td>Introduction to Automobile Engineering</td>
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### Summary of Eight Semesters

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credit Hour</th>
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<tbody>
<tr>
<td>Semester I (First Year First Semester)</td>
<td>21</td>
</tr>
<tr>
<td>Semester II (First Year Second Semester)</td>
<td>21.5</td>
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<tr>
<td>Semester III (Second Year First Semester)</td>
<td>21</td>
</tr>
<tr>
<td>Semester IV (Second Year Second Semester)</td>
<td>22.5</td>
</tr>
<tr>
<td>Semester V (Third Year First Semester)</td>
<td>19.5</td>
</tr>
<tr>
<td>Semester VI (Third Year Second Semester)</td>
<td>18.5</td>
</tr>
<tr>
<td>Semester VII (Fourth Year First Semester)</td>
<td>20</td>
</tr>
<tr>
<td>Semester VIII (Fourth Year Second Semester)</td>
<td>16</td>
</tr>
<tr>
<td><strong>Total Credit in Eight Semesters</strong></td>
<td><strong>160</strong></td>
</tr>
</tbody>
</table>
Semester-I (First Year First Semester)

RME 1101: Fundamentals of Mechanical Engineering - 3 Credit


Books Recommended:

2. Introduction to Thermodynamics and Heat Transfer - Yunus A. Cengel, McGraw Hill.
3. Heat Engineering - V.P. Vasandani and D.S.Kumar, Metropolitan.

RME 1102: Fundamentals of Computing – 3 Credit

Number System: Binary, Decimal, Hexadecimal, Octal number systems, Arithmetic in Different Number Systems.


Input and Output Devices: I/O Operations and Interfaces, Input Devices, Output Devices.

Microprocessors: Functions of Microprocessors, Organization of a Microprocessor, Arithmetic Logic Unit, Control Unit.

Memory Organization: Classification of Memory, Memory Hierarchies, Primary Memory, Secondary Memory, Comparisons of Primary Memory and Secondary Memory.

Computer Software: Software, Classification of Software, Programming Languages, The Role of BIOS, Language Translators, Operating System, Tasks of an OS, Types of OS.


Books Recommended:

3. Introduction to Computers - Peter Norton, McGraw-Hill Education.

RME 1103: Differential and Integral Calculus - 3 Credit

Differential Calculus:

Functions: Functions and their Graphs (Polynomial, Rational, Logarithmic, Exponential, Trigonometric, Hyperbolic Functions and Combination of such Functions

Limits, Continuity and Differentiability: Concepts and Definitions, One Sided Limits, Limit at Infinity and Infinite Limits, Limit Laws, Sandwich Theorem, Continuous and Discontinuous Functions with Properties, Intermediate Value Theorem, One Sided Derivatives, Differentiability of Functions.


Applications of Differentiations: Analysis of Functions, Absolute Extrema, Applied Maximum and Minimum Problems, Rolle’s Theorem, Mean-Value Theorem.

Integral Calculus:


Books Recommended:


RME 1104: Physics - 3 Credit


**Radioactivity:** Radioactive Decay, Half Life, Mean Life, Nuclear Binding Energy, Alpha, Beta, Gamma Decay, Photoelectric Effect.

**Books Recommended:**

1. Physics (Volume I and II) - Robert Resnick, David Halliday and Kenneth S. Krane, Wiley
2. Fundamentals of Physics - David Halliday, Robert Resnick and Jearl Walker, Wiley

RME 1105: Chemistry - 3 Credit


**Books Recommended:**

3. Physical Chemistry – Peter Atkins and Julio de Paula, OUP Oxford.
RME 114: Physics Lab – 1.5 Credit

Practical Classes based on the Topics Covered in RME 1104.

RME 115: Chemistry Lab – 1.5 Credit

Practical Classes based on the Topics Covered in RME 1105.

RME 116: Engineering Drawing Lab – 1.5 Credit


Books Recommended:


RME 117: Machine Shop and Workshop Practices Lab – 1.5 Credit

Foundry: Introduction to Foundry, Tools and Equipment.

Patterns: Function, Pattern Making.

Molding: Molding Materials, Types of Mold, Procedure.

Cores: Types, Core Making Materials, Metal Melting and Casting.


Metal Joints: Riveting, Grooving, Soldering.

Welding Practice: Electric Arch Welding, Spot Welding, Pressure Welding.
Semester-II (First Year Second Semester)

RME 1201: Fundamentals of Mechatronics Engineering - 3 Credit

**Introduction:** Definition and Components of Mechatronics, Applications of Mechatronics, Relationship amongst Different Disciplines.

**System Models:** Building Blocks of Electrical, Mechanical, Fluid and Thermal Systems, Electromechanical Systems.

**Control Systems:** Open and Closed Loop Systems, Analogue and Digital Control Systems.

**Sensors and Transducers:** Sensors for Displacement, Proximity, Motion, Sound, Light, Temperature, Force, Pressure, Fluid Level, Fluid Flow etc.

**Signal Conditioning and Data Acquisition:** Filtering, Pulse Modulation, A/D and D/A Converters, Multiplexers, Data Acquisition Systems.


**Controllers:** Control Modes, PID and Digital Controllers, Velocity Control, Adaptive Control, Microprocessor and Microcontrollers, Programmable Logic Controllers: Fundamentals of PLCs, Mnemonics and Timers, Relays and Counters, Master and Jump Control, Data Control, Analog I/O Control.

**Design of Mechatronics Systems:** Steps of Mechatronics System Design, Possible Design Solutions.

Case Studies on Application of Mechatronics Systems.

**Books Recommended:**


RME 1202: Fundamentals of Electrical and Electronics Engineering - 3 Credit

**Electrical:**

**Direct Current Circuits:** Laws and Theorems.

**DC Network Analysis:** Delta/Star Transformation, Source Conversion.

**Circuit Variables and Elements:** Voltage, Current, Power, Energy, Independent and Dependent Sources, and Resistance.

Techniques of Circuit Analysis: Nodal and Mesh Analysis including Supernode and Supermesh with Applications in Circuits having Independent and Dependent Sources.

Network Theorems: Source Transformation, Thevenin’s, Norton’s and Superposition Theorems with Applications in Circuits having Independent and Dependent Sources, Maximum Power Transfer Condition and Reciprocity Theorem.


Energy Storage Elements: Inductors and Capacitors, Series Parallel Combination of Inductors and Capacitors.

Electronics:


Books Recommended:

1. Introduction to Circuit Analysis- Robert L. Boylestad, Pearson.
RME 1203: Fundamentals of Programming – 3 Credit


**Data Types and Conditional Logics:** Basic I/O, Data Types, Conditional Logics such as If, If-Else, Switch.

**Operators:** Arithmetic, Relational, Logical and Bitwise Operators, Operator Precedence and Associativity, Arithmetic Expression Evaluation.

**Loops:** Looping Basic, Necessity of Loops, While Loop, For Loop, Do While Loop, Nested Loop.

**Formatted I/O:** Specifying Width using Format Specifier in printf and scanf in Details.

**Arrays:** Basics of Array, Accessing through Indices, Accessing using Loops, Two Dimensional Arrays.

**Functions:** Basic Functions, Different Types of Functions, Local and Global Variables, Call by Value, Call by Reference, Passing Arrays in a Function as Parameter, Recursion, Scope Visibility and Lifetime of Variable.

**Strings:** Basics, I/O Operations using String, Basic Operations without using Library Functions, Basic String Operations.

**Structures:** Basics, Accessing, Initialization, Array of Structures.

**Pointers:** Basics, Pointer Operation, Call by Reference using Pointers, Pointer for Array, Array of Pointers.

**Dynamic Memory Allocation:** Basics, Malloc, Free, Calloc.

**File Operation:** Basics, File Opening, Closing, File I/O.

**Books Recommended:**
1. The C Programming Language - Brian W. Kernighan and Dennis M. Ritchie, Prentice Hall.

RME 1204: Linear Algebra - 3 Credit


**System of Linear Equations:** Linear Equations, System of Linear Equations (Homogeneous and Non-homogeneous), Solutions of System of Linear Equations using Different Methods, Applications to Network Flow and Electrical Networks.
**Vector Space:** Vectors in $\mathbb{R}^n$ and $\mathbb{C}^n$, Vector Space, Subspace, Linear Dependence of Vectors, Basis and Dimension of Vector Spaces, Change of Bases, Row Space and Column Space of Matrix, Rank of Matrices, Solution Space of System of Linear Equations.

**Linear Transformation:** Linear Transformations, Example and Illustrations with Applications, Kernel and Image of a Linear Transformation and their Properties.

**Eigenvalues and Eigenvectors of Matrices:** Eigenvalues and Eigenvectors, Diagonalization, Cayley-Hamilton Theorem, Applications.

**Books Recommended:**

2. Linear Algebra - S. Lipshutz, Schaum’s Outline Series.

**RME 1205: Accounting – 3 Credit**


**Books Recommended:**

5. Advanced Accounting - M.M. Khan.
RME 1206: Functional English – 2 Credit

Grammar: Articles, Verb Patterns, Sentence Combining Subordination and Coordination, Conditional Sentences, The Infinitive, Gerund, and Participle, Subject-Verb Agreement.

Writing: Paragraph and Analytical Writings, Writing on Current Affairs, Scientific Writing. Commercial Correspondences: Defining Context, Feedback and Semantic Gap. Different types of Commercial and Business Letter Writing, Writing of Different Types of Reports on Specific Topics. Reading: Basic Reading Skills (Skimming, Scanning, Making Inferences, Recognizing Patterns) and Apply these Skills in an Extensive Reading Environment.

Speaking: Developing Speaking Skill which will include Strategies for Communication and an Acquaintance with Phonetics. Effective Oral Presentation. Tasks will include Making Statements, Requests, Inquiries, Disagreeing, Complaining and Apologizing, Discussing, and other Oral Presentations.

Listening: Practice Listening to Spoken English and Taking Useful Notes.

Books Recommended:

2. From Paragraph to Essay: Developing Composition Writing - Maurice L Imhoof and Herman Hudson, Longman.

RME 1211: Fundamentals of Mechatronics Engineering Lab – 1.5 Credit

Practical Classes based on the Topics Covered in RME 1201.

RME 1212: Fundamentals of Electrical and Electronics Engineering Lab - 1.5 Credit

Practical Classes based on the Topics Covered in RME 1202.

RME 1213: Fundamentals of Programming Lab - 1.5 Credit

Practical Classes based on the Topics Covered in RME 1203.
RME 2101: Instrumentation and Measurement - 3 Credit


**Industrial Pressure and Level Measurements:** Industrial Pressure Measurement, Definition of Pressure, Types of Pressure Measuring Element, Examples and Applications of Pressure Measuring Elements, Definition of Level, Types of Level Measuring Elements, Examples and Applications of Level Measuring Elements.

**Measurement of Power and Energy:** Induction and Electrodynamometer, Induction Type Wattmeter, Maximum Demand Indicator, Power Factor Meter.

**Error in Measurement and their Statistical Analysis:** Types of Error, Statistical Treatment of Measurement Data, Probability of Errors and Gaussian Error Curve, Limiting Errors.


**Books Recommended:**


RME 2102: Digital Logic Circuit and Microprocessor - 3 Credit

**Digital Logic Circuit:**

**Arithmetic Circuits:** Half Adder, Full Adder, Half Subtractor, Full Subtractor, Parallel Adder/Subtractor.

**Sequential Logic:** NAND and NOR Latches, Different Types of Flip-Flops, FF Timing Consideration.

**Complex Sequential Logic:** Frequency Division and Counting, Different Types of Counters, Propagation Delay, Decoding a Counter, Shift Registers.

**MSI Logic Circuits:** Decoder and Encoder, Multiplexer and Demultiplexer, Analog-to-Digital Converter, Digital-to-Analog Converter.

**Memory Devices:** Semiconductor Memory Technologies, ROM Architecture, RAM Architecture.
Microprocessor:

**Introduction to Microprocessor:** Evolution of Microprocessor, Overview of Microcomputer.

**8086 Microprocessor:** Introduction, Architecture, Instruction Sets, Constructing Machine Codes for 8086 Instructions, Addressing Modes, Interrupts and 8259A (Priority Interrupt Controller), Higher Versions of 8086.

**Pentium Microprocessor:** Introduction to Pentium Microprocessor, Pentium Processor Architecture, Register Sets, Cache, Floating Point Operations, Addressing Modes, Paging, Instruction Set, Interrupt, Protected Mode Operations.

Books Recommended:

3. Microprocessors and Interfacing: Programming and Hardware- D.V. Hall, McGraw-Hill

RME 2103: Engineering Mechanics - 3 Credit

**Introduction to Mechanics:** Basic Concepts of Mechanics, Statics of Particles, Equivalent System of Forces in Rigid Bodies, Equilibrium of Rigid Bodies.

**Centroid and Center of Gravity:** Centroids of Lines, Areas and Volumes. Center of Gravity of 2D and 3D Bodies, Center of Gravity of Composite Bodies.

**Analysis of Structures:** Analysis of Trusses by Method of Joints and Method of Section, Analysis of Frames and Machines, Forces in Beams and Cables.

**Friction:** Types of Friction, Laws of Friction, Angles of Friction, Wedges.

**Moment of Inertia:** Moments of Inertia of Areas, Moment of Inertia of Mass.

**Kinematics:** Kinematics of Particles, Kinematics of Rigid Bodies.


Books Recommended:

RME 2104: Multivariate and Vector Calculus – 3 Credit


Books Recommended:


RME 2105: Managerial and Engineering Economics – 3 Credit

Introduction: Economics, Wants and Scarcity, Macro and Micro Economics, Methods used in Microeconomics, Microeconomic Models, Basic Concepts used in Economics.


Elasticity and its Application: Price and Income Elasticity of Demand, Cross-Price Elasticity of Demand, Price Elasticity of Supply.

Production Theory and the Costs of Production: Costs, Total Revenue, Total Cost and Profit, Opportunity Cost, The Production Function, Total-Cost Curve, Fixed and Variable Costs, Average and Marginal Cost, Costs and Profit Maximization, Return to Scale, Monopoly, Oligopoly, Monopolistic Competition.


Market Failure and Solutions: Information Asymmetry, Adverse Selection, Moral Hazard, Principal-Agent Problem.
**Concepts of Macroeconomics:** GDP, GNP, National Income Accounting, Inflation, Unemployment, Fiscal and Monetary Policies.

**Books Recommended:**


**RME 2106: Society and Technology – 3 Credit**

**History and Philosophy of Science and Technology:** Paradigm and the Structure of Scientific Revolutions.

**Approaches to Studying Society and Technology Relationship:** Technological Determinism, Social Determinism, Social Construction of Technology (SCOT), Actor Network Theory (ANT).

**Transition Theory and Socio-technological Pathways:** Niche Formation, Regime and Landscape.

**Diffusion Theory:** The Nature of Technological Diffusion into the Society Attributes of Innovation and their Rate of Adoption.

**Technology and Public Participation:** Types of Participation, Ladder of Citizen Participation, Stages of Market Participation, Mutual Shaping of Participation and Technology.

**Professional Ethics:** Ethics of Technology Design and Use, Regulatory Issues in Governing Technologies.

**Use and Impact of Technologies in Various Social Aspects:** Risks and Uncertainties, Biomedical and Genetic Technologies, Robotics in Warfare or Replacement of Workforce, Social Media Effect, Artificial Intelligence.

**Books Recommended:**

RME 2111: Instrumentation and Measurement Lab – 1.5 Credit

Practical Classes based on the Topics Covered in RME 2101.

RME 2112: Digital Logic Circuit and Microprocessor Lab – 1.5 Credit

Practical Classes based on the Topics Covered in RME 2102.

Semester-IV (Second Year Second Semester)

RME 2201: Introduction to Robotics – 3 Credit


Mechanical Design of Robots: Links and Joints, Kinematic Chain, Mechanisms and Machines, Degrees of Freedom, Robot End Effectors.

Spatial Descriptions and Transformations: Description of Position, Orientation and Frames, Homogeneous Transformations.


Manipulator Dynamics: Recursive Newton-Euler Formulation of Serial Manipulator, Lagrangian Formulation of Serial Manipulator.


Books recommended:

1. Modeling and Control of Robot Manipulators - Sciavicco and Siciliano, McGraw-Hill
3. Robot Analysis - Lung-Wen Tsai, Wiley & Sons Inc.
RME 2202: Microcontroller and Programmable Logic Controller – 3 Credit

Microcontroller:


**The 8051 Microcontroller:** Features, Architecture of 8051, Block Diagram of 8051, I/O Ports, Functions of Each Pin of 8051.

**Registers and their Functions of 8051:** General Purpose and Special Function Registers.

**Timer and Counter:** Timer Registers, Timer Control Register (TCON), Timer Mode Control Register (TMOD).

**Interfacing with External Memory:** Memory Capacity, Memory Organization, Speed, Interfacing External ROM, Real World Interfacing.

**8051 Instruction Set:** Data Transfer Instructions, Arithmetic Instructions, Logical Instructions, Branching and Control Transfer Instructions, Arithmetic and Logical Operations, Subroutines, Addressing Modes.

**Programming and Applications of Microcontroller:** Programming for Speed Control of a DC Motor, Flushing an LED, Case Studies.

Programmable Logic Controller:

**Fundamentals of PLC:** Basic Functional Components of PLC, Applications, Importance, Classification, Comparison of PLC with Relay Panel.

**Internal Architecture of PLC:** Hardware, Block Diagram and Operation of PLC, Memory, Storage Capacity, Bus System.

**Communication between PC and PLC:** Serial Communication, Ethernet, IOT etc.

**Ladder Programming:** Ladder Programming Conventions, Logic Functions, Latching, Sequencing.

**Types of Instructions:** Timer/Counter Instructions, Logical Instructions, Compare Instructions, Move Instructions, Program Control Instructions.

**PLC Programming:** Motor Control using PLC, Central Heating System, Robot Control System.

**Books Recommended:**

4. Microprocessors and Microcontrollers - N. Senthil Kumar, OUP India.
RME 2203: Object Oriented Programming – 3 Credit


Objects and Classes: Attributes and Functions, Constructors and Destructors, The Default Copy Constructor, Static Class Data, Operator Overloading, Function Overloading.

Inheritance: Derived Class and Base Class, Derived Class Constructors, Overriding Member Functions, Abstract Base Class, Public and Private Inheritance, Multilevel Inheritance, Multiple Inheritance, Ambiguity in Multiple Inheritance

Virtual Functions: Virtual Functions, Pure Virtual Functions, Static Binding, Dynamic Binding, Friend Functions, Static Functions, Friend Class.


Exception and Exception Handling: Exception Handling Fundamentals, Exception Types, Chained Exception, Creating Own Exception Subclasses.

Books Recommended:
1. Teach Yourself C++ - Herbert Schildt, Tata McGraw-Hill Education.

RME 2204: Electrical Machines - 3 Credit


DC Generator: Types, No-Load Voltage Characteristics, Build-Up of a Self Excited Shunt Generator, Critical Field Resistance, Load-Voltage Characteristic, Effect of Speed on No-Load and Load Characteristics and Voltage Regulation.


Three Phase Induction Motor: Construction, Types, Rotating Magnetic Field, Principle of Operation, Slip, Frequency of Rotor Current, Rotor emf, Rotor Current, Expression for Torque,
Conditions for Maximum Torque, Torque Slip Characteristics, Effect of Change in Supply Voltage on Torque, Relation between Full Load Torque and Maximum Torque.


**Books Recommended**:


**RME 2205: Differential Equations and Coordinate Geometry - 3 Credit**

**Differential Equations**:


**First Order Differential Equations**: Separable Equations, Homogeneous Equations, Exact Differential Equations, Linear and Bernoulli Equations, Special Integrating Factors, Substitutions and Transformations.


**Coordinate Geometry**:


**Three-dimensional Geometry**: Coordinates in Three Dimensions, Direction Cosines and Direction Ratios, Equations of Planes and Lines.

**Books Recommended**:


**RME 2206: Statistics for Engineers – 3 Credit**

**Basic Statistics:** Basic Concept of Statistics, Classification and Tabulation, Frequency Distribution and Construction of Frequency Distribution, Statistical Graphs for Frequency Distributions.

**Measures of Central Tendency:** Mean, Median, Mode, Quartile, Percentile.

**Measures of Variation:** Range, Mean Deviation, Standard Deviation, Co-Efficient of Variation.

**Simple Correlation and Linear Regression Models:** Measures of Correlation, Scatter Diagram, Karl Pearson’s Correlation Coefficient – Properties, of Karl Pearson’s Correlation Coefficient, Spearman’s Rank Correlation Coefficient, Multiple Correlations, Regression – The Method of Least Squares, Inferences Based on Least Square Estimators.

**Probability:** Sample Spaces and Events, Theorems of Probability, Conditional Probability, Mathematical Expectation, Joint Probabilities and Independence, Bayes’ Theorem, Law of Large Numbers, Central Limit Theorem, Chebyshev’s Inequality.


**Inferences / Testing of Hypothesis:** Point Estimation, Bayesian Estimations, Null Hypothesis, Test Statistics, Type I And II Errors, Level of Significance, One-Tailed And Two-Tailed Tests, P-Value, Power of a Test, Confidence Intervals, Hypothesis Test Concerning One and Two Population Mean, Hypothesis Test Concerning One and Two Population Proportions, Tests about a Population Variances.

**Books Recommended:**


**RME 2211: Introduction to Robotics Lab – 1.5 Credit**

Practical Classes based on the Topics Covered in RME 2201.
RME 2212: Microcontroller and Programmable Logic Controller Lab – 1.5 Credit

Practical Classes based on the Topics Covered in RME 2202.

RME 2213: Object Oriented Programming Lab – 1.5 Credit

Practical Classes based on the Topics Covered in RME 2203.

Semester-V (Third Year First Semester)

RME 3101: Artificial Intelligence – 3 Credit

Introduction: Agents and Environment.


Machine learning: Supervised Learning, Decision Trees, Reinforcement Learning, Q-learning.


Knowledge Representation: Ontological Engineering, Categories and Objects, Events, Reasoning Systems for Categories.


Books Recommended:

5. Prolog Programming for Artificial Intelligence - Ivan Bratko, Pearson Education.
RME 3102: Advanced Mechatronics Engineering – 3 Credit

**Introduction:** Identification of Software into Mechatronics Systems, Identify Types of Industrial Sensors in Mechatronics System, Advanced Applications of PLC, Advanced Applications of Microcontroller.

**Control System in Mechatronics:** Actuation Principles, Control Systems and its Role in Mechatronics.

**Interfacing:** Interfacing of Software with Hardware, Real-time Computation Tasks.


**Books Recommended:**


RME 3103: Mechanics of Solids and Fluids - 3 Credit

**Mechanics of Solids:**

**Introduction to Solid Mechanics:** Concept of Stresses and Strains, Hooke’s Law, Stress-Strain Diagram.

**Stress and Strain Analysis:** Axially Loaded Members, Statically Indeterminate Problems, Thermal Stress, Stresses in Thin Walled Cylinder.

**Torsion:** Torsion Formula, Angle of Twist, Stresses in Helical Springs.

**Beams:** Shear and Bending Moment Diagrams, Flexure and Shear Stresses in Beams, Deflection of Beams- Double Integration Method.

**Columns:** Definition and Types, Critical Load and Euler’s Formula, Critical Stress and Slenderness Ratio, Intermediate Column Formulas, Secant Formula.

**Combined Stresses:** Principal Stresses, Mohr’s Circle.

**Mechanics of Fluids:**

**Introduction to Fluid Mechanics:** Development and Scope of Fluid Mechanics, Fluid Properties, Flow Properties, Newtonian and Non-Newtonian Fluids.

Dimensional Analysis and Similitude: Different Methods of Dimensional Analysis, Geometric, Kinematic and Dynamic Similarity, Dimensionless Numbers in Fluid Mechanics.


Fluid Flow Measurement Techniques: Pitot Tube, Nozzle, Orifice Meter, Venturi Meter, Weir etc.

Books Recommended:

6. Fluid Mechanics through Worked out Problems - Dr. Md. Quamrul Islam, IUT.

RME 3104: Mathematical Analysis for Engineers – 3 Credit


Books Recommended:


**RME 3105: Industrial Management – 3 Credit**

Industrial Dynamics and the Interplay with Competitors and Stakeholders (Customers, Suppliers, Employees, the Society at Large and so on), the Distinctive Character of Industrial Operations, Organization and Human Resource Management, Innovation and Entrepreneurship, Leadership, Strategic Planning, Marketing, Cost-Volume-Profit Analysis, Finance (Supply and Use of Capital), Cash-Flow Analysis, Investment Appraisal, Management Control, and Costing.

**Books Recommended:**


**RME 3111: Artificial Intelligence Lab – 1.5 Credit**

Practical Classes based on the Topics Covered in **RME 3101**

**RME 3112: Advanced Mechatronics Engineering Lab – 1.5 Credit**

Practical Classes based on the Topics Covered in **RME 3102**

**RME 3113: Mechanics of Solids and Fluids Lab – 1.5 Credit**

Practical Classes based on the Topics Covered in **RME 3103**
Semester-VI (Third Year Second Semester)

RME 3201: Intelligent Systems and Robotics - 3 Credit

Introduction to Intelligent Systems (Current and Future), Potential Applications of Intelligent Systems and Robotics, Knowledge Based Systems, Expert Systems, Agents and Agent Systems, Robotics and Control Systems, Neural Networks, Artificial Neural Networks, Attribute-Based Learning, Relation-Based Learning, Probability-Based Learning, Surprise-Based Learning, Hybrid Intelligent Systems, Uses and Limitations, Robot Behaviors, Behavior-Based Architecture, Clustering and Classification Techniques, Philosophy and Ethics of Intelligent Systems in Robotics.

Books Recommended:

4. Intelligent Systems and Robotics - George Zobrist, C Y Ho, CRC Press.

RME 3202: Manufacturing Process with CNC Programming – 3 Credit

Introduction: Basic Concepts of Manufacturing Processes, Classification of Manufacturing Processes.

Metal Casting: Casting Processes for Ferrous and Non-Ferrous Metals, Casting Defects, Design of Molds, Riser, Gate Sprue and Core.

Joining Methods: Soldering, Brazing, Welding- Gas, Arc, TIG, MIG etc.

Different Machining Processes: Various Operations, Cutting Tools and Their Analyses in Turning, Milling, Drilling, Shaping, Grinding etc.

Forming and Shaping: Sheet Metal Forming, Punching, Blanking, Drawing, Injection Molding, Compression Molding, Blow Molding etc.


Books Recommended:


RME 3203: Power Electronics and Drives - 3 credit


Power Electronics:

Devices: Thyristor, Triac.

Power Amplifiers: Classification of Output Stages.

AC/AC Power Converters: Phase Controlled Converters - Single Phase and Three Phase, AC Switch, Cycloconverter.

DC/DC Converters: Choppers (Step Down and Step Up), Switching Regulators (Buck, Boost, Buck-Boost).

DC/AC Converters: Single Phase and 3-Phase Inverters.

Power Supplies: Linear and Switched Mode Power Supplies.

Drives:

Motor Drives: Vector and Servo Drives (Stepper, DC, Induction, Brushless PM and Switched-reluctance).


Books Recommended:

RME 3204: Control Systems Design – 3 Credit

**Introduction:** Introduction to Control Systems and their Representation by Different Equations.

**Transfer Functions:** Laplace Transforms, Mathematical Model of Physical System, PI and PID Controllers, Hydraulic and Pneumatic Controllers, Time Domain Analysis, Transient Response of First and Second Order Systems.

**Introduction to Nonlinear Control:** State Space Analysis, Optimal and Adaptive Control, Introduction to Discrete-time Systems and Z-transform.

**Modern Control System:** Concepts of States, State Variable and State Models Linear Continuous Time and Discrete Time, State Space Models, Similarity Transformation, Transform Function to State Space Representation, Controllability and Stabilizability, Absorbability and Detectability Canonical Decomposition, Polo Assignment by State Feedback. Observers, Continuing State Feedback with an Observer.

**Controller and Final Control Element:** Control Valves, Controller Configuration, System Control, System Design, Common Control Methodologies - P, D, I, PI, PD and PID.

**Books Recommended:**


RME 3205: Bangladesh Studies – 2 Credit

**History:** Historical Background of Bangladesh, Ancient Bengal, the Medieval Bengal, Mughal Period, British Rule in Bangladesh, Pakistan Period, The Impact of British and Pakistan Rules on the Economy and Education of the People, Language Movement of 1952, Events Leading to the Mass Upsurge of 1969, War of Independence and the Emergence of Bangladesh in 1971.

**Geophysical Condition:** Position of Bangladesh in Global Map, Current District and Thana Administrations and Locations, Rivers in Bangladesh and their Importance.

**Cultural Development:** Development of Bengali Cinema, Drama, Literature Movement, Socio-cultural Development in Recent Bangladesh.

**Industrial Development:** Introduction of Industries, Structure of Industries, Export Development, Industrial Export-Import Policies of Bangladesh.

**Educational Development:** Education Structure in Primitive and Present Situation, Educational Policies, Crisis of Implementation, Literacy Rate, Current Situation of Educational Environment in Bangladesh, Computer Literacy.

Books Recommended:

2. History of Bengal: Vol 1, 2, Dhaka University.

RME 3211: Intelligent Systems and Robotics Lab – 1.5 Credit

Practical Classes based on the Topics Covered in RME 3201.

RME 3212: Manufacturing Process with CNC Programming Lab – 1.5 Credit

Practical Classes based on the Topics Covered in RME 3202.

RME 3213: Power Electronics and Drives Lab - 1.5 credit

Practical Classes based on the Topics Covered in RME 3203.

semester-vii (fourth year first semester)

RME 4101: Advanced Robotics – 3 Credit


Kinematics of Parallel Manipulators: Forward and Inverse Kinematics of Parallel Manipulators.

Dynamics of Parallel Manipulators: Newton-Euler Formulation and Lagrangian Formulation of Parallel Manipulators.

Jacobian Analysis of Parallel Manipulators: Singularity Conditions, Conventional and Screw Based Jacobian of Parallel Manipulators.

Case Studies to Design a Robotic System.
Books recommended:

4. Robot Analysis - Lung-Wen Tsai, Wiley & Sons Inc.

RME 4102: Digital Image Processing and Robot Vision – 3 Credit


Image Acquisition: Image Sampling and Quantization, Image Quality, Image Storage.


Image Transforms: Discrete Fourier Transform, Fast Fourier Transform, Discrete Cosine Transform, Wavelet Transform,

Image Feature Extraction and Representation: Edge and Line, Region Segmentation and Representation, Image and Video Compression.

Object Recognition: Pattern and Pattern Classes, Template Matching, Statistical Methods, Biometric Case Studies - Face, Iris, Fingerprint Recognitions.


Books Recommended:


RME 4103: Digital Signal Processing – 3 Credit


**Books Recommended:**


**RME 4104: Mechanical Power Transmission Systems – 3 Credit**

**Power Transmission Devices:** Introduction to Mechanical Drive Systems and Components, Design and Analysis of Spur and Helical Gears, Cam Design, Design of Power Transmission Shafts, Roller Contact and Journal Bearings, Brakes and Clutches.

**Power Transmission Systems:** Gear Trains, Belt, Rope and Chain Drives, Hydraulic Drive Systems, Efficiency of Different Power Transmission Systems.

**Couplings:** Types and Functions of Couplings Used in Industrial Power Transmission Systems.

**Converters:** Fluid, Electrical and Mechanical Converters.

Case Studies Based on the Application of Mechanical Power Transmission Systems.

**Books Recommended:**

4. Total Design – S Pugh, Addison Wesley.

**RME 4111: Advanced Robotics Lab – 1.5 Credit**

Practical Classes based on the Topics Covered in **RME 4101**.

**RME 4112: Digital Image Processing and Robot Vision Lab – 1.5 Credit**

Practical Classes based on the Topics Covered in **RME 4102**.
RME 4113: Digital Signal Processing Lab – 1.5 Credit

Practical Classes based on the Topics Covered in RME 4103.

RME 4115: Research Methodology, Technical and Scientific Writing Lab – 1.5 Credit

**Introduction:** Definition of Research, Objectives, Motivation, Concept and Importance in Research, Features of a Good Research Design.

**Types of Research:** Qualitative and Quantitative Research, Fundamental Research, Applied Research, Engineering Research.

**Methodologies for Research:** Research Proposals, Research Planning, Legal Research.

**Research Ethics:** Ethical Issues Related to Publishing, Plagiarism and Self Plagiarism, Uses of References, Copyright.


**Skills:** Presentation Skills and Communication Skills.

**Books Recommended:**

2. Research Methodology: Methods and Techniques - C. R. Kothari, New Age International Pvt Ltd.
4. Research Planning and Proposal Writing Skill - Dr. Subrota Kumar Saha.

**RME 4100: Project – 2 Credit**

In this course, students are required to undertake a major project in engineering analysis, design development of research. The objective is to provide an opportunity to develop initiative, self-reliance, creative ability and engineering judgment. In this semester, students will submit their intermediate work and in the next semester (Semester VIII) they will submit the final projectwork (RME 4200).
Semester-VIII (Fourth Year Second Semester)

RME 4201: Human Robot Interaction – 3 Credit


Books Recommended:


RME 4211: Human Robot Interaction Lab – 1.5 Credit

Practical Classes based on the Topics Covered in RME 4201.

RME 4200: Project – 4 Credit

In this course, students are required to undertake a major project in engineering analysis, design development of research. The objective is to provide an opportunity to develop initiative, self-reliance, creative ability and engineering judgment. In this semester they will submit the final project work based on the intermediate submitted work (RME 4100) of the previous semester (Semester VII).

Optional Courses

Group-A

RME 4221: Introduction to Machine Learning - 3 Credit


**Linear Models for Regression:** Maximum Likelihood and Least Squares, Regularized Least Squares, Bias Variance Decomposition, Bayesian Linear Regression.

**Linear Models for Classification:** Fisher's Linear Discriminant, Probabilistic Generative Models - Parametric (Maximum Likelihood and Bayesian) and Non-parametric Density Estimation.


**Applications of machine learning:** Applications in robotic control, data mining, autonomous navigation, bioinformatics, speech recognition, and text and web data processing.

**Books Recommended:**

1. Introduction to Machine Learning - Ethem Alpaydin, MIT Press.

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**RME 4222: Introduction to Biomedical Engineering - 3 Credit**


**Applications of Electric Fields for Bio-analysis Methods Applied to Genomic and Proteomic Research:** Electrophoresis and Isoelectric Focusing, Mass Spectrometry of Bio-molecules.

**Electrocardiography (ECG):** Waveform, ECG Preamplifiers, Systolic, Diastolic and Mean Detector Circuits.


Applications of Biomedical Engineering in Robotics.

**Books Recommended:**

2. Electromagnetics with Applications - John D. Kraus and Daniel A. Fleisch, McGraw Hill.
RME 4223: Mobile Robotics - 3 Credit


Kinematics: Kinematic Models for Front-wheel and Differential-drive Steering Vehicles.

Localization and Mapping: Vehicle State Estimation using Bayes Filters, Kalman Filters, and Particle Filters, Onboard Localization and Mapping.

Motion Planning: Types of Locomotion, Vehicle Motion Modelling, Graph Based and Probabilistic Motion Planning, Planning for Autonomous Operation.

Remote Sensing: Different Types of Sensors used in Mobile Robots, Sensor Modeling.

Mobile Robot Control: Heading and Speed Control, Reference Trajectory and Incremental Control.


Case Studies.

Books Recommended:

1. Autonomous Mobile Robots - Siegwart and Nourbakhsh, MIT Press.

RME 4224: Simulation and Modeling - 3 Credit


Dynamical, Finite State, and Complex Model Simulations: Graph or Network Transitions Based Simulations, Actor Based Simulations, Mesh Based Simulations, Hybrid Simulations.

Converting to Parallel and Distributed Simulations: Partitioning the Data, Partitioning the Algorithms, Handling Inter-partition Dependencies.


Simulations Results Analysis and Viewing Tools: Display Forms - Tables, Graphs, and Multidimensional Visualization, Terminals, X and MS Windows, and Web Interfaces, Validation of Model Results.

Books Recommended:

RME 4231: Introduction to Machine Learning Lab – 1.5 Credit

Practical Classes based on the Topics Covered in RME 4221.

RME 4232: Introduction to Biomedical Engineering Lab – 1.5 Credit

Practical Classes based on the Topics Covered in RME 4222.

RME 4233: Mobile Robotics Lab – 1.5 Credit

Practical Classes based on the Topics Covered in RME 4223.

RME 4234: Simulation and Modeling Lab – 1.5 Credit

Practical Classes based on the Topics Covered in RME 4224.

**Group - B**

RME 4225: Material Science and Engineering - 3 Credit


**Atomic Structure and Bonding:** Elementary Particles, Electronic Distribution and Atomic Size/Structure, Bonding- Primary and Secondary, Effect of Bonding on Material Properties.


**Phase Diagrams:** Origin, Construction, Interpretation and Application of Binary Phase Diagrams With Reference to a Few Important Metallic and Ceramic Systems, Iron-Iron Carbide Phase Diagram.


**Heat Treatment:** Annealing, Normalizing and Hardening, Different Types of Surface Hardening Techniques, Metals and Alloys.
**Engineering Materials:** Structure, Properties, Processing, Fabrication and Application of- Metals and Alloys, Ceramics and Advanced Ceramics, Glass, Plastics and Composites.

**Books Recommended:**


**RME 4226: Machine Design and System Dynamics - 3 Credit**

**Machine Design:**


**System Dynamics:**


**Books Recommended:**

2. System Dynamics - Ogata, K., Prentice Hall.

**RME 4227: Introduction to Nanoscience and Nanotechnology - 3 Credit**


Different Classes of Nanomaterials: Quantum Dots, Gold, Silver, Different Types of Nano-oxides, Al₂O₃, TiO₂, ZnO etc. Carbon Nanotubes, Preparation Properties and Applications Like Field Emission Displays. Nanocomposite, Nanopolymers, Nanoglasses, Nanoceramics etc.


Application of Nanomaterials: Molecular Motors, Energy Storage, Electronic-nano Particles for Molecular Diagnostics, Nano Biosensors, Nanopharmaceuticals, Nanoparticle-Based Drug Delivery, Nanostructures for Tissue Engineering/Regenerative Medicine etc. Handling, Safety and Hazard of Nanomaterials Processing.

Books Recommended:

1. Nanocomposite Science and Technology - Pulikel M. Ajayan, Wiley.

RME 4228: Introduction to Automobile Engineering - 3 Credit

Introduction: Introduction to Road Vehicles, Components of Automobile.


Automotive Safety: Brakes, Reduction of Injuries.
**Automotive Body:** Materials, Vehicle Shape, Chassis, Springs and Suspension Systems, Steering System, Tyre.

**Vehicular Automation:** EFI Engines, Anti-lock Braking (ABS) system, Cruise Control, Traction Control System (TCS), Electronic Stability Control (ESC), Dynamic Steering Response (DSR).

**Books Recommended:**

2. Test Automotive Handbook – Bosch GmbH distributed by SAE.