

## Interdisciplinary M.Tech Program: Additive Manufacturing

(Participating Departments: MAE, MSME, BME, Des, CHE)

### Curriculum

| Course #                   | Course Title   | Credits          | Offered By                    |
|----------------------------|--|------------------|-------------------------------|
| <b><i>Semester I</i></b>   |  |                  |                               |
| AM5010 <sup>@</sup>        | Fundamentals of Additive Manufacturing   | 3                | MAE                           |
| AM5020 <sup>@</sup>        | Product Design and Prototyping   | 2                | Des                           |
| BM4190                     | Biofabrication   | 2                | BME                           |
| AM5030 <sup>@</sup>        | Materials for Additive Manufacturing   | 2                | MSME                          |
| LAXxxx                     | English for Communication  | 1                | LA                            |
| xxxxxx                     | Elective course(s) (from any one or more of the four elective baskets) <sup>Page 2</sup> | 3                | All participating departments |
| <b><i>Sub-Total</i></b>    |  | <b><i>13</i></b> |                               |
| <b><i>Semester II</i></b>  |  |                  |                               |
| BM5093                     | Biofabrication Technology Lab  | 1                | BME                           |
| AM5041 <sup>@</sup>        | Additive Manufacturing Processes Lab   | 1                | MAE                           |
| AM5100 <sup>@</sup>        | Industrial Lectures  | 1                | All participating departments |
| xxxxxx                     | Elective courses (from any one or more of the four elective baskets) <sup>Page 3</sup>   | 12               | All participating departments |
| <b><i>Sub-Total</i></b>    |  | <b><i>15</i></b> |                               |
| <b><i>Semester III</i></b> |  |                  |                               |
| AM6015 <sup>@</sup>        | Thesis-1   | 12               | All participating departments |
| <b><i>Sub-Total</i></b>    |  | <b><i>12</i></b> |                               |
| <b><i>Semester IV</i></b>  |  |                  |                               |
| AM6025 <sup>@</sup>        | Thesis-2   | 12               | All participating departments |
| <b><i>Sub-Total</i></b>    |  | <b><i>12</i></b> |                               |
| <b>Total Credits</b>       |  | <b>52</b>        |                               |

<sup>@</sup> These are all new courses. The course contents of all the program-specific core/elective courses (with AM prefix) are enclosed herewith for Senate approval. The course contents of all other new elective courses (with non-AM prefix) are being processed through the respective departments for Senate approval.

### Distribution of Credits

| Type   | Number of credits | % of Total Credits (52) |
|--|-------------------|-------------------------|
| Core courses (including lab courses)                 | 11                | 21                      |
| Elective courses                                     | 15                | 29                      |
| Soft skills (English and industrial lecture courses) | 2                 | 4                       |

|        |    |    |
|--------|----|----|
| Thesis | 24 | 46 |
|--------|----|----|

### Elective Courses in Semester I

| <b>Basket</b>  | <b>Course #</b>     | <b>Course Title</b>                                  | <b>Credits</b> | <b>Offered By</b> |
|--|---------------------|--|----------------|-------------------|
| <i>Systems Integration for Additive Manufacturing</i>      | AM5050 <sup>@</sup> | Life Cycle Analysis                                  | 1              | MAE               |
|  | ME5020              | Elasticity & Plasticity                              | 1.5            | MAE               |
|  | ME5090              | Computational Tools for Geometric Modelling          | 1.5            | MAE               |
| <i>Computational Techniques for Additive Manufacturing</i> | ME5130              | Finite Element Methods                               | 3              | MAE               |
|  | ME5010              | Mathematical Methods for Engineers                   | 3              | MAE               |
|  | AM5060 <sup>@</sup> | Augmented Reality & Virtual Reality                  | 1              | MAE/Des           |
| <i>Bio Additive Manufacturing</i>                          | BM5090              | Biomaterials: Materials in Medicine                  | 2              | BME               |
|  | BM5110              | Lab on Chip  | 1              | BME               |
|  | PB5220              | Advanced Fabronics                                   | 2              | CHE               |
|  | CHxxxx <sup>@</sup> | Microfluidic Platform for Cell Culture & Diagnostics | 1              | CHE               |
| <i>Metal Additive Manufacturing</i>                        | MSxxxx <sup>@</sup> | Metal Additive Manufacturing                         | 3              | MSME              |
|  | MS5050              | Advanced Physical Metallurgy                         | 3              | MSME              |
|  | MS5130              | Powder Metallurgy Manufacturing                      | 3              | MSME              |
|  | MS5030              | Materials Synthesis and Characterization             | 3              | MSME              |

## Elective Courses in Semester II

| Basket   | Course #            | Course Title   | Credits | Offered By |
|--|---------------------|--|---------|------------|
| <i>Systems Integration for Additive Manufacturing</i>      | ME5040              | Computational Fluid Dynamics                               | 1.5     | MAE        |
|  | ME5030              | Fluid Mechanics and Heat Transfer                          | 1.5     | MAE        |
|  | ME5530              | Industry 4.0   | 1.5     | MAE        |
|  | AM5070 <sup>@</sup> | Design for Additive Manufacturing                          | 1       | MAE        |
|  | CE6130              | Finite Element Analysis                                    | 3       | CE         |
| <i>Computational Techniques for Additive Manufacturing</i> | MS5140              | Introduction to Computational Methods in Materials Science | 3       | MSME       |
|  | ME7100              | Advanced Topics in Mathematical Tools                      | 3       | MAE        |
|  | ME6040              | Machine Learning and Its Applications                      | 3       | MAE        |
|  | AM5080 <sup>@</sup> | Topology Optimization with Additive Manufacturing          | 1       | MAE        |
| <i>Bio Additive Manufacturing</i>                          | BM6120              | Tissue Engineering   | 2       | BME        |
|  | BM6070              | Biomicrofluidics   | 2       | BME        |
|  | AM5090 <sup>@</sup> | 3D Printing in Medicine                                    | 2       | BME        |
|  | MS5150              | Biomaterials - Materials in Medicine                       | 3       | MSME       |
|  | CHxxxx <sup>@</sup> | Introduction to Microfluidics and Microreactors            | 2       | CHE        |
| <i>Metal Additive Manufacturing</i>                        | MSxxxx <sup>@</sup> | Metallurgy of Welding and Additive Manufacturing           | 3       | MSME       |
|  | MSxxxx <sup>@</sup> | Structure and Characterization of Metallic Materials       | 3       | MSME       |
|  | MSxxxx <sup>@</sup> | Advanced Mechanical Behaviour of Materials                 | 3       | MSME       |
|  | MS5030              | Microstructure Engineering for Advanced Manufacturing      | 3       | MSME       |
|  | MSxxxx <sup>@</sup> | Advanced Thermodynamics of Materials                       | 3       | MSME       |
|  | MS5040              | Thermo-Mechanical Processing of Materials                  | 3       | MSME       |
|  | ME5720              | Advanced Material Joining Processes                        | 1.5     | MAE        |