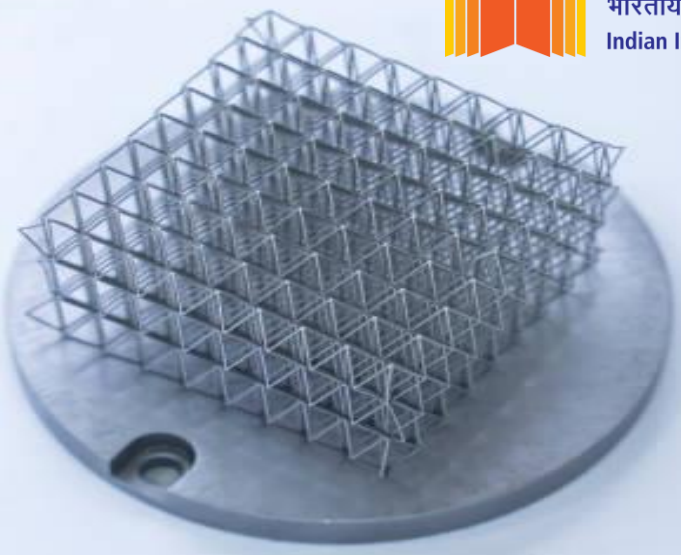
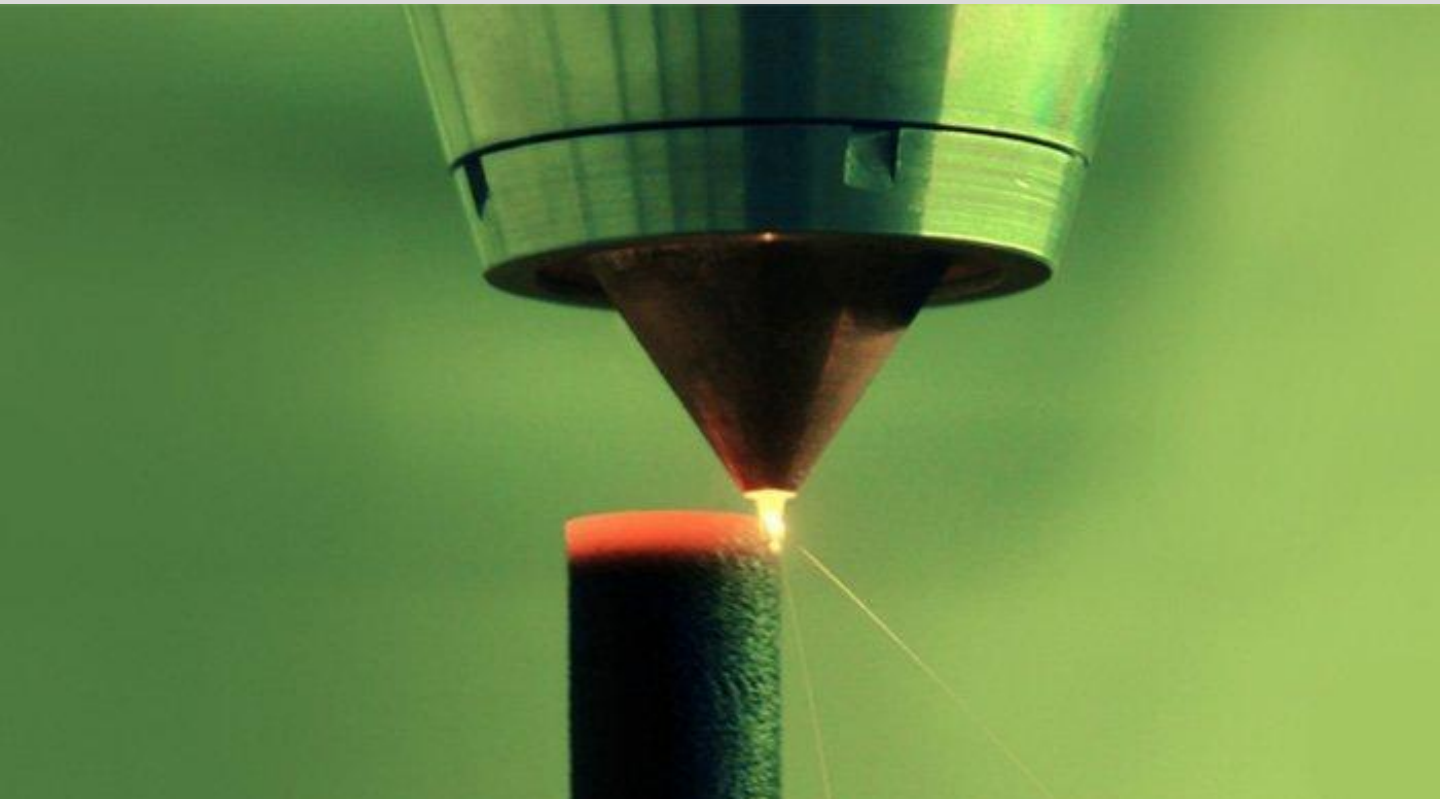


DEPARTMENT BROCHURE 2022-23

# IIT Hyderabad ADDITIVE MANUFACTURING

## Center for Interdisciplinary Program

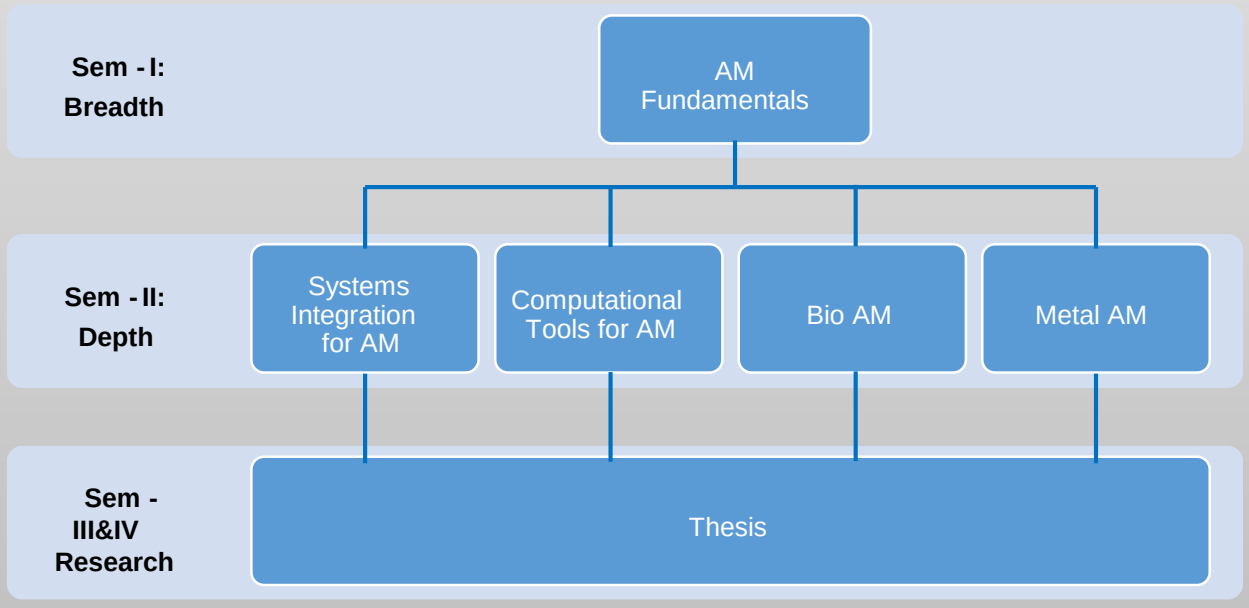
PIONEERING THE CUTTING-EDGE OF DIGITAL MANUFACTURING



## Background:

- The primary objective of this interdisciplinary MTech program is to generate qualified human resources for taking up challenging careers in Additive Manufacturing (AM) industries.
- The course is designed to capture the interdisciplinary nature of AM technologies and equip students with specialized knowledge in the field of AM. The course contents cover both fundamental scientistic principles and applied engineering aspects of AM technologies.
- Special emphasis is laid on imparting hands-on skills to the students in designing and building parts various AM technologies.
- The course leverages the strong eco-system of AM research at IITH, thus providing the students an opportunity to conduct research at the forefronts of AM technologies.

## Course Outline:



## Course Structure:

| Course Title | Credits |
|---|---|
| Semester I | |
| Fundamentals of Additive Manufacturing | 3 |
| Product Design and Prototyping | 2 |
| Biofabrication | 2 |
| Materials for Additive Manufacturing | 2 |
| English for Communication | 1 |
| Elective course(s) (from any one or more of the four elective baskets)* | 3 |
| Sub-total | 15 |
| Semester II | |
| Biofabrication Technology Lab | 1 |
| Additive Manufacturing Processes Lab | 1 |
| Industrial Lectures | 1 |
| Elective courses (from any one or more of the four elective baskets)** | 12 |
| Sub-total | 15 |
| Semester III and IV | |
| Thesis | 24 |
| Total Credits | 52 |

## Elective Courses in Semester I (the list is not exhaustive) :

| Basket | Course Title | Credits |
|---|---|---|
| Systems Integration for Additive Manufacturing | Life Cycle Analysis | 1 |
| | Elasticity & Plasticity | 1.5 |
| | Computational Tools for Geometric Modelling | 1.5 |
| Computational Techniques for Additive Manufacturing | Finite Element Methods | 3 |
| | Mathematical Methods for Engineers | 3 |
| | Augmented Reality & Virtual Reality | 1 |
| Bio Additive Manufacturing | Biomaterials: Materials in Medicine | 2 |
| | Lab on Chip | 1 |
| | Advanced Fabrionics | 2 |
| | Microfluidic Platform for Cell Culture & Diagnostics | 1 |
| Metal Additive Manufacturing | Metal Additive Manufacturing | 3 |
| | Advanced Physical Metallurgy | 3 |
| | Powder Metallurgy Manufacturing | 3 |
| | Materials Synthesis and Characterization | 3 |

## Elective Courses in Semester I (the list is not exhaustive) :

| Basket | Course Title | Credits |
|---|---|---|
| Systems Integration for Additive Manufacturing | Computational Fluid Dynamics | 1.5 |
| | Fluid Mechanics and Heat Transfer | 1.5 |
| | Industry 4.0 | 1.5 |
| | Design for Additive Manufacturing | 1 |
| | Finite Element Analysis | 3 |
| Computational Techniques for Additive Manufacturing | Introduction to Computational Methods in Materials Science | 3 |
| | Advanced Topics in Mathematical Tools | 3 |
| | Machine Learning and Its Applications | 3 |
| | Topology Optimization with Additive Manufacturing | 1 |
| Bio Additive Manufacturing | Tissue Engineering | 2 |
| | Biomicrofluidics | 2 |
| | 3D Printing in Medicine | 2 |
| | Biomaterials - Materials in Medicine | 3 |
| | Introduction to Microfluidics and Microreactors | 2 |
| Metal Additive Manufacturing | Metallurgy of Welding and Additive Manufacturing | 3 |
| | Structure and Characterization of Metallic Materials | 3 |
| | Advanced Mechanical Behaviour of Materials | 3 |
| | Microstructure Engineering for Advanced Manufacturing | 3 |
| | Advanced Thermodynamics of Materials | 3 |
| | Thermo-Mechanical Processing of Materials | 3 |
| | Advanced Material Joining Processes | 1.5 |

# Faculty:

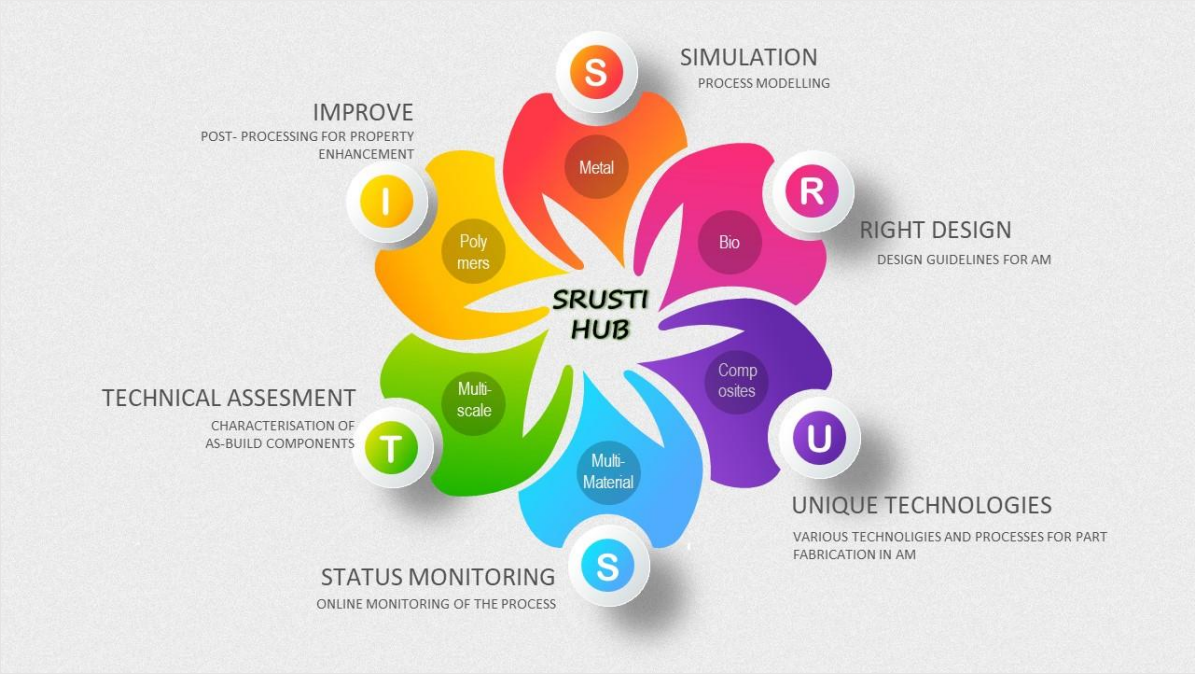
Faculty from Mechanical & Aerospace Department and Material Science Department working together for the development of Additive Manufacturing.

- Dr. Prasad Onkar, *Design*
- Dr. Falguni Pati, *BME*
- Dr. G. D. Janaki Ram, *MSME*
- Dr. S. Suryakumar, *MAE*
- Dr. N. Venkata Reddy, *MAE*
- Dr. C. Vishwanath, *MAE*
- Dr. M. Gopinath, *MAE*
- Dr. Suhash Ranjan Dey, *MSME*
- Dr. Rajesh Korla, *MSME*
- Dr. Bharat Bhooshan Panigrahi, *MSME*
- Dr. Vishwanath Chinthapenta, *MAE*
- Dr. Syed Nizamuddin Khaderi, *MAE*

# Students: Batch of 2021-23

| Student | Project |
|---|---|
| Nitin P. Puthran | Design for AM: Feature Recognition for Non-planar deposition. |
| Aman Jain | Wire+Powder Hybrid Direct Energy Deposition (DST Sponsored Project) |
| Sarath Chandra Reddy | Industry Project – Pratt & Whitney |
| Nagesha B. K | Characterization of LPBF processed CM247LC material(Industry Sponsored – GTRE DRDO |
| Akula Ramesh | Additive Manufacturing of Co-Cr Alloys for Dental Applications(Industry Sponsored – DRDL DRDO) |
| Bibek Das | Industry Project – Pratt & Whitney |
| Vedanth Bhatnagar | Industry Project – Pratt & Whitney |

# AM at IIT Hyderabad: Srusti Hub




Equipment:

- Wire Arc Additive Manufacturing Machine(WAAM)
- Laser + Powder Hybrid Direct energy Deposition (DED)
- Selective Laser Melting (SLM) Machine.
- Multi-Color Binder Jetting 3D Printer.
- FDM and SLA Machine.
- Extrusion Based 3D Bioplotter.
- Composite 3D Printer.
- Transmission Electron Microscope.
- Scanning Electron Microscope.
- Material Synthesis and Characterisation Lab.
- 3D Reverse engineering system
- Simufact additive and mimics (software)

For more info: Srusthi Hub

## **Placement Team** :

Please reach out to the ***Office of Career Services*** at IITH for any further queries (https://ocs.iith.ac.in/)

Student Placement Coordinators:

- Nitin Padmashekar Puthran
  - +91 80978 12456
  - am21mtech11002@iith.ac.in
  - linkedin.com/in/nitin-puthran-895372140
- Bibek Das
  - +91 82952 82546
  - am21mtech16001@iith.ac.in
  - linkedin.com/in/aman-jain-0255a7171
- Aman Jain
  - +91 9810775586
  - am21mtech11003@iith.ac.in
  - linkedin.com/in/bibek-das-230131192

For more information please contact program coordinators:

- Dr. Prasad Onkar (psonkar@des.iith.ac.in)
- Dr. Falguni Pati (falguni@bme.iiyh.ac.in)