

MTech in Medical Device Innovation Offered Jointly by IIT Hyderabad and Asian Institute of Gastroenterology(AIG) Hyderabad.

The Program:

This is a multifaceted experience from grass root innovation to product development, business plan and entrepreneurship. The program will be instructed in a structured and design-oriented manner with the help of experienced faculty, staff, and industry experts, serial entrepreneurs, and academic community.

Duration: 2 years with 48+2 credits (including 24 thesis credits in 3rd and 4th semester)

As part of their project credits, the teams made from the students, would undergo a complete design life cycle comprising of:

- Clinical immersions to identify problems,
- Validate the needs,
- Brainstorm on ways to address the needs
- Build technology prototypes
- Build business and IP management
- Deliver outcomes

There will be an option that after finishing one year of courses (24+2 credits), the working professionals from Industry and Hospitals can do the project components of 3rd and 4th semester in their respective working places. The capstone project component can be done by

1. Industry professionals in Industry;
2. Doctors in their working hospital;
3. Others at IITH

Eligibility:

A structured hands-on project-based program, suitable for industry professionals or healthcare professionals. The candidates will be shortlisted based on their academic merit with

- CGPA of 7.0 or above for all except medical subjects or equivalent and
- 55% for medical courses

And then they will be selected via written test/interview.

The students should be eligible with a degree of:

- BTech in any of Biomedical, Biotechnology, Electrical, Computer Science, Chemical, Design, Mechanical, or Material Science or similar subject areas
- B Des
- MSc in any discipline
- MBBS, BAMS, BHMS, BDS

with a passion for improving the healthcare quality and conditions over the globe.

Candidates with industry experience of one year or more or with entrepreneurial inclination will be preferred and are encouraged to apply.

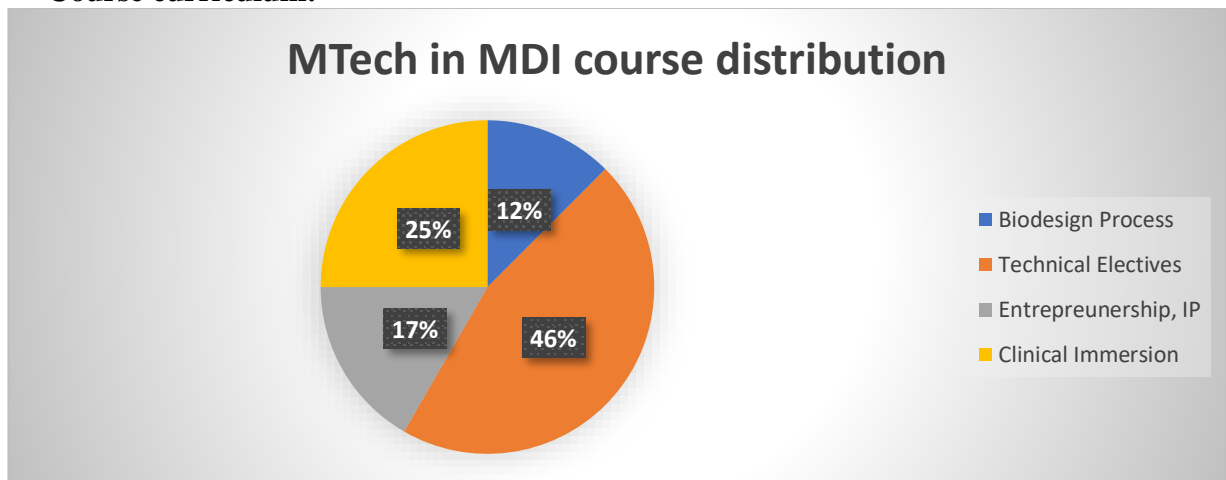
Fee structure:

The MTech program in Medical Device Innovation can be either of:

1. Self-sponsored with fees: ₹10 lacs INR approx., including the course fees for pedagogy (core and elective credits at ₹25,000 per credit) and Project credits (at ₹25,000 per 2 credits).

2. Govt. Lab/ Public Sector sponsored category

Course curriculum:



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Course No.	Courses	Core/ Elective	Credits
	Semester 1		
BM 5346	Biodesign-1	Core	1
BM 5060	Cellular Physiology	Core	0.5
BM 5070	Systems Physiology	Core	1.5
BM 4190	Biofabrication	Core	2
BM 5193	Product design and Prototyping	Core	1
BM 5013	Sensors and Transducers in Healthcare	Core	2
BM 5023	Biomedical Devices	Core	2
BM 5332	Clinical immersion (Phase I)	Core-AIG	2
	Sub-total		12 credits
	Semester 2		
BM 6346	Biodesign-2	Core	2
BM 6302	Clinical immersion (Phase II)	Core-AIG	2
BM 6311/ FC 1010	Intellectual property and Rights	Core	1
BM 6321	Safety and regulations	Core	1
BM 6316/ FC 3654	Business Plan and Entrepreneurship	Core	1
XXXX	Technology Electives (as offered at IITH)	Electives	5
	Sub-total		12 credits
	Common Courses		
LA xxxx	English Communications	Core	1
xxxx	Industry Lectures	Core	1
BM 5305/ BM 6305	Capstone Project in 3 rd and 4 th semester (12 credits each)	Core	24
	Total credits		50 credits

Elective courses for MTech in MDI

Course no.	Course name	Semester	Credits
BM 5093	Biofabrication Technology	II	1
BM 6243	Neuromechanics	II	2
BM 5030	Scientific computing	I	1
BM 6140	Introduction to brain and neuroscience	I	1
BM 6120	Tissue Engineering	II	2
BM 6070	Biomicrofluidics	II	2

BM 6323	Basic Bioinformatics	II	2
BM 6090	Biomedical imaging	II	2
	Any other elective courses after recommendation by the advisor and HOD to fill the student's knowledge gap		

Courses to be approved for MTEC-MDI from Dept. of Biomedical Engineering

Course code : BM5346

Course name : Biodesign-1

Num of credits : 1

Semester : 1

Prerequisites : None

Course Description:

This course focuses on a design process thinking for Innovations in healthcare. The course will teach the students how to make the best use of clinical immersion before starting the clinical immersion and how to take problems with potential to get a device innovation after clinical immersion. It will teach the students the components to obtain unmet needs in the healthcare setting.

Course contents:

The curriculum aims at exposing the students to unmet needs in the clinic and introduce a systematic design process thinking to arrive a solution to the problems. The course will have detailed case studies and problem-based learning sessions on Biodesign. A short report is required to be submitted as a course evaluation, which is aimed to encourage students to think innovatively about biomedical engineering.

References

1. Zenos, Makover, P. Yock, Biodesign, Cambridge University Press (2009)

2. Resources distributed in class

Course code : BM6346

Course name : Biodesign-2

Num of credits : 2

Semester : 2

Prerequisites : None

Course Description: This course focuses on a design process thinking for Innovations in healthcare. The course will begin after a clinical immersion component to obtain unmet needs in the healthcare setting. The students will then undergo training in the biodesign process thinking.

Course contents:

Students will visit some hospitals and observe patient experiences and interactions with medical devices. They will also interact with physicians to better understand their perspectives. The curriculum aims at exposing the students to unmet needs in the clinic and introduce a systematic design process thinking to arrive a solution to the problems. The course will have detailed case studies and problem-based learning sessions on Biodesign. A short report is required to be submitted as a course evaluation, which is aimed to encourage students to think innovatively about biomedical engineering.

References:

1. Zenos, Makover, P. Yock, Biodesign, Cambridge University Press (2009)

2. Resources distributed in class

Course code : BM5332

Course name : Clinical Immersion (Phase 1)

Num of credits : 2

Semester : 1

Prerequisites : None

Course Description: In this course, students will visit the AIG group of hospitals accompanied by the doctors to observe, find, and note the different unmet clinical needs.

Course contents: Students will visit the AIG group of hospitals accompanied by doctors to note down all unmet needs of patients. They will observe the operating theatre, procedures, patients and all parts of hospital to find the problems associated with proper patient care delivery. They will learn by a discussion based method of all the problem scenario acquired from the hospitals.

References: Harrison's textbook of internal medicine, Mc Graw Hill publication

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Course code : BM6302

Course name : Clinical Immersion (Phase II)

Num of credits : 2

Semester : 2

Prerequisites : None

Course Description: In this course, students will visit the AIG group of hospitals accompanied by the doctors to observe, find, and note the different unmet clinical needs.

Course contents: Students will visit the AIG group of hospitals accompanied by doctors to find the feasibility of their ideas, solutions in the previously found unmet needs of patients. They will observe the operating theatre, procedures, patients and all parts of hospital to find further problems associated with proper patient care delivery to refine their ideas further. They will learn by a discussion based method of all the problem scenario acquired from the hospitals.

References: Harrison's textbook of internal medicine, Mc Graw Hill publication

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Course code : BM6311

Course name : Intellectual property and Rights

Num of credits : 1

Semester : 2

Prerequisites : None

Course description: The students will learn the intellectual property and their rights to use it. They will learn about patentability of their inventions and related laws to make anything patent.

References:

1. Fundamentals of Intellectual Property Rights: For Students, Industrialist and Patent Lawyers

by Ramakrishna B & Anil Kumar H.S

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Course code : BM6321

Course name : Safety and regulations

Num of credits : 1

Semester : 2

Prerequisites : None

Course description: The students will learn the device safety and different regulations before it is allowed for clinical use. Medical device safety and the regulation of Medical Devices for Public Health and Safety examines the prospects for achieving global harmonization in medical device regulation and describes a possible future global system. Unresolved difficulties will be discussed while solutions will be proposed.

References:

1. Medical Device Safety: The Regulation of Medical Devices for Public Health and Safety

Medical Device Safety: The Regulation of Medical Devices for Public Health and Safety

by G.R Higson

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Course code : BM6316

Course name : Business plan and Entrepreneurship

Num of credits : 1

Semester : 2

Prerequisites : None

Course contents: Without a business plan no bank, venture capital house, or corporate parent will consider finance for start up, expansion or venture funding. In this course, all aspects of business planning for entrepreneurs, senior executives and students will be taught. As per the tutor, successful real-life business plans will be given as examples of learning. The procedures required to produce that persuasive plan will be taught. The various stages of businesses at various stages in their development will be exemplified.

References:

1. Preparing Effective Business Plans: An Entrepreneurial Approach (Pearson Entrepreneurship) by Bruce R. Barringer

The Business Plan Workbook, by Robert Brown, Paul Barrow

Course code : BM 5305

Course name : Capstone project-1

Num of credits : 12

Semester : 1

Prerequisites : None

Course contents: The students will present their problem statement, market value and their probable solution with the product ideas.

Course code : BM 6305

Course name : Capstone project-2

Num of credits : 12

Semester : 2

Prerequisites : None

Course contents: The students will present their product solution to the problem statement, their business values and a prototype to be examined.

Course code : BM 6323

Course name : Bioinformatics

Num of credits : 2

Semester : 2

Prerequisites : None

Course description: Practical course to learn diseases at genetic and proteomic level.

Course contents: Biological Data from different sources in internet. Sequence of DNA, protein, and finding protein structures based on the data. Formats of databases. Conventions for database indexing and specification of search terms, Common sequence file formats. Organism specific databases and analysis. Sequence Similarity Searches: Local versus global. Distance metrics. Methods of sequence alignment, FASTA, BLAST and PSI BLAST. Multiple Sequence Alignment and software tools for pairwise and multiple sequence alignment. Phylogenetics structural bioinformatics genomics and proteomics.

References:

1. Bioinformatics and Functional Genomics (2nd edition) by Jonathan Pevsner, Wiley-Blackwell.
2. Essential Bioinformatics. Jin Xiong, 2007.