

**IIT MADRAS**

**DETAILS OF DEPARTMENTS AND  
SPECIALIZATIONS OFFERED**

## Department of Aerospace Engineering

The Department of Aerospace Engineering at the Indian Institute of Technology, Madras (IITM) was established in 1969. Since then it has been in the fore front of fundamental and applied research & development with scientific and social impact in the country. The department has been involved in activities supporting our national ambitions in the field of Aerospace Engineering. Continued interaction with R&D agencies of international repute in the field of aerospace engineering has led to mutually beneficial research activities. One of the major contributions to our society has been in the form of training manpower via graduate research programs (PhD and Master of Science by research) as well as course based programs (M.Tech, Dual Degree and B.Tech). Graduate and undergraduate programs offered are of international repute and considered the best in the country. Various alumni from this department have been at the forefront of research organizations in the country and elsewhere. Department offers a vibrant academic atmosphere which enables independent research and free exchange of ideas.

Program	No. of Students
B.Tech.	34
<b>Dual Degree</b>	
B.Tech in Aerospace Engg & M.Tech in Applied Mechanics	5
B.Tech & M.Tech	19
M.Tech.	18
M.S.	43
Ph.D.	28
<b>Total</b>	<b>139</b>

## **Department of Applied Mechanics**

The Department of Applied Mechanics has been in existence since 1959 and has grown into a full fledged inter disciplinary graduate research department over the years. The Department focuses on academic activities in three broad areas viz., Biomedical Engineering, Fluid Mechanics and Solid Mechanics. The Department has played a major role in contributing to the academic community and society. The faculty have won international recognition for their industrial research and sponsored projects. Some of the facilities available in various laboratories of this Department are unique in the country.

<b>Program</b>	<b>No. of Students</b>
<b>M.Tech.</b>	
Engineering Mechanics	7
Bio Medical	4
M.S.	42
Ph.D.	36
<b>Total</b>	<b>89</b>

## Department of Biotechnology

The Department of Biotechnology at IIT Madras was founded in 2004 with a vision to be recognized as a Department of International repute with a strong interdisciplinary research and teaching base in biological sciences and engineering and an active collaboration with industries and health-care institutions. The department is housed in the 'Bhupat and Jyoti Mehta School of Biosciences'. Currently the department has 32 faculty members, about 251 under graduate students, 204 Ph.D. and 17 M.S. Research Scholars, associated staff and Adjunct Faculty.

These are exciting and challenging times for Biotechnologists. Modern biotechnology, finds applications in a variety of domains such as in the manufacture of high-technology pharmaceuticals as well as in the making of enzymes for the detergents we use for washing our clothes. With expanding knowledge of the cell and its functioning at the molecular level, biotechnologists are now seeking answers to prevent life threatening diseases, to meet the energy and food requirements of ever-growing population and also to solve the environmental problems that threaten our very existence on this planet. The diversity of challenges that Biotechnology tackle is reflected in the research activities of the faculty of Biotechnology at IIT Madras. Although there are many different research groups in the department, their research generally falls into one or more of the following categories: medical biotechnology related to cancer and cardiovascular aspects, chemical biology, computational biology and bioprocesses.

Program	Number of Students
<b>Dual Degree (B.Tech &amp; M.Tech)</b>	
(B.S. & M.S.) Biological Science	15
(B.Tech & M.Tech) Biological Engineering	28
<b>M.Tech.</b>	
Clinical Engineering	7
M.S.	4
Ph.D.	63
<b>Total</b>	<b>117</b>

## Department of Chemical Engineering

The Chemical Engineering Department at IITM is a happening place with an exciting bunch of talented faculty and motivated students. The last few years have seen a dramatic increase in industrial collaboration and consultancy, research projects, research publications and faculty awards. Our students have actively participated in National and International Conferences and won many Best Paper/poster awards. In recent years, several publications have made it to the Journal Cover pages.

We have revised our academic curriculum to be in tune with the current developments in the field while retaining the core concepts from the discipline. Faculty introduce new electives related to their research and these are pretty well subscribed.

The Department's vision is to be a global centre of academic and research excellence in Chemical Engineering Sciences and Technology, where knowledge is vigorously and meticulously pursued and disseminated, application to industry and society is valued, free thinking is encouraged, intellectual rigour is demanded and thoroughness is rewarded. We are in the process of establishing world class research facilities and research groups in specific areas of energy, environment and materials.

Program	No. of Students
B.Tech.	63
Dual Degree (B.Tech & M.Tech) Chemical Engg.	16
<b>M.Tech.</b>	
Chemical Engineering	30
Catalysis Technology	2
M.S.	9
Ph.D.	8
<b>Total</b>	<b>128</b>

## Department of Chemistry

The Department of Chemistry at IIT Madras has been engaged in imparting the highest level and quality of Chemistry Education to Engineering and Science students of the institute, since its inception in 1959. The department has focused upon addressing key scientific problems which have gathered worldwide appreciation and recognition. The M.Sc. curriculum offered by the Department is rigorous in accord to international standard and covers theory and practical courses with full emphasis to construct intellectual assets. A research project of one year is a requisite for the partial fulfillment towards the award of M.Sc. degree and 'research ready' post graduate students produced through this program. Department of Chemistry has a vibrant research program which includes all frontier areas of research. It has 34 faculties on roll who works in synthesis, property examination and theoretical aspects of matter at molecular level. The funding for research comes from various government and private organizations. We have adequate equipment for carrying out cutting edge science and our research findings are published in peer reviewed journals. Ph.D. students are trained through rigorous course work and are conscientious in carrying out cutting-edge research. The rigor of academic study at each level are balanced with a number of other related activities which include several co-curricular activities.

Program	No. of Students
M.Sc. (Chemistry)	54
Ph.D. (Inorganic/Organic/Physical/Theory)	50
<b>Total</b>	<b>104</b>

## Department of Civil Engineering

The Department of Civil Engineering offers courses and activities that encompass Planning, Design, Construction and Management of engineering projects. The academic programmes, B. Tech., M.Tech., M.S. and Ph.D., of the Civil Engineering department at IIT Madras are some of the best in the country and the world. Our students work on projects that are at the forefront of technological advancements in this field. Many of the faculty members have received advanced degrees and/or training from reputed institutions worldwide. Many of our alumni hold prestigious positions in leading academic institutions, industry and government in different countries all over the world. Our students specialize in the following areas of civil engineering:

- Building Technology and Construction Management (BTCM)
- Environmental and Water Resources Engineering (EWRE)
- Geotechnical Engineering (GT)
- Structural Engineering (ST)
- Transportation Engineering (TR)

Program	No. of Students
B.Tech.	58
<b>Dual Degree</b>	
B.Tech in Civil Engg & M.Tech in Applied Mechanics	4
(B.Tech & M.Tech) Civil Engineering	9
Building Technology & Construction Management	9
Environmental Engineering	1
Hydraulic & Water Resource Engineering	1
Infrastructural Civil Engineering	12
Structural Engineering	6
Transportation Engineering	1
<b>M.Tech</b>	
Structural Engineering	9
Building Technology & Construction Management	5
Environmental Engineering	6
Geotechnical Engineering	7
Hydraulic & Water Resource Engineering	5
Transportation Engineering	4
M.S.	37
Ph.D.	82
<b>Total</b>	<b>256</b>

## **Department of Computer Science & Engineering**

The mission of the CSE Department is to impart knowledge, both theoretical and practical, to enable the student to solve challenging real world computing and related problems upon graduation. The CSE Department at IIT Madras brings together a highly talented and motivated set of professors and students, with a wide range of expertise in various domains of CSE. The Department offers B.Tech, Dual Degree, M.Tech., M.S and Ph.D. programs. A strong foundation in the core aspects of CSE that can be applied to solve practical and large scale system problems is a key component of the CSE curriculum both in the theory courses as well as the labs. Correspondingly, there is a strong emphasis on teamwork and interdisciplinary applications of CSE knowledge.

<b>Program</b>	<b>No. of Students</b>
B.Tech.	31
Dual Degree	28
M.Tech	48
M.S.	25
Ph.D.	10
<b>Total</b>	<b>142</b>

## Department of Electrical Engineering

Our department was established in 1959. We currently have about 1063 students, 65 faculty members, 37 supporting staff members, Inspire Faculty 2, PDF for Women 1, DBT Ramalingaswami Fellow 1 and 2 Institute post-doctoral fellows with us.

We perform a variety of research work from absolute fundamentals to component design to system integration to deployment/commercialization. We have strong industry interaction and have been involved in development of state-of-art products. We house extensive fabrication, calibration and testing facilities for carrying out academic projects, sponsored research and consultancy projects.

Program	No. of Students
B.Tech.	73
<b>Dual Degree</b>	
B.Tech in Electrical Engg & M.Tech in Applied Mechanics	7
B.Tech & M.Tech Electrical Engg	55
<b>M.Tech</b>	
Communication Systems	15
Control and Instrumentation Systems	9
Micro Electronics and VLSI Design	15
Power Systems and Power Electronics	6
Photonics	4
M.S.	40
Ph.D.	20
<b>Total</b>	<b>244</b>

## Department of Engineering Design

The Department of Engineering Design was established in IIT Madras as its 16th Department with a focus on interdisciplinary teaching and research. The Department launched the novel dual degree programme in Engineering Design with a view to providing the much needed leadership in this area. The first of its kind in the country, the programme constitutes a B.Tech specialisation in Engineering Design and M.Tech specialisations in Automotive Engineering and in Biomedical Design with a strong thrust on the modern practices of design.

Engineering design involves the development of a concept and a form to meet a function. Students are introduced to the design process in the first year along with fundamental mathematics, science and engineering, graphic art, design, and aesthetics. They are trained not only on the mechanical aspects of design, but also in electronics, controls, and embedded systems for all round skill development. Courses in geometric modeling, finite elements, materials engineering, automotive engineering, robotics and biomedical device engineering are also offered.

The Department has several state-of-the-art facilities including graphic arts studios and modern laboratories for automotive systems, automotive engines, computer aided design, rapid prototyping, ergonomics mechatronics, product design, controls and vehicle dynamics.

A unique feature of our curriculum is the semester-long internship in the industry during which our students work on a 'live' project and receive exposure to current global design practices.

Program	No. of Students
<b>Dual Degree</b>	
Automotive Engineering	42
Biomedical	13
M.S.	28
Ph.D.	25
<b>Total</b>	<b>108</b>

## **Department of Humanities and Social Sciences**

Founded in 1959 the Department of Humanities and Social Sciences is one of the oldest in IIT Madras.

The Department's essentially inter-disciplinary nature is its distinguishing factor. This allows students to develop an appreciation for a very diverse set of fields, including Development Studies, Economics, English Studies, Environmental Studies, History, International Relations, Philosophy, Political Science, and Sociology. The Department offers both Master's and Doctoral programmes, as well as electives for B.Tech and M.Tech students.

Coupled with its multi-disciplinary background, the Department boasts of a highly diverse and experienced faculty. It has an excellent student-teacher ratio, providing opportunities for academically intense learning.

Equipped with state of the art facilities in a serene campus, the department offers an enriching academic environment.

<b>Program</b>	<b>No. of Students</b>
<b>M.A</b>	
Development Studies	25
English Studies	22
<b>Ph.D.</b>	7
<b>Total</b>	<b>54</b>

### **Department of Management Studies**

In addition to the MBA programme, the Department of Management Studies offers research program leading to MS and PhD in the various functions of management. The Department also offers a unique program in Entrepreneurship leading to an MS degree. The research programs are aimed to develop (a)exceptional faculty resource in various areas of management (b) professionals capable of leading innovative industries research and development activities. Research activities at the Department are in the areas of Operation and supply chain management, Logistics Management, Financial Management, Marketing Management, Human Resource, Information System and Integrative Methodologies. Both the Program (MS and PhD) have a combination of a taught element consisting of postgraduate level and research level courses, and a rigorous research process requiring publications in international journals and participation in international conference.

<b>Program</b>	<b>No. of Students</b>
MBA	52
M.S	15
Ph.D.	15
<b>Total</b>	<b>82</b>

## Department of Mathematics

Mathematics, hailed as the “Queen of Sciences” by Carl Fredrich Gauss, dreaded by many and loved by an equal number, has progressed rapidly since the beginning of recorded history. Mikhail B. Sevryuk noted in January 2006 that “the number of papers and books included in the Mathematical Reviews database since 1940(the first year of publication of MR) is now more than 1.9 million and about 75 thousand items are added to the database each year”.

At IIT Madras, the Department of Mathematics was set up in 1960. Abstraction and application rooted in quantitative reasoning sustain all its activities. International Collaboration through MOUs signed by the institute aids the exchange of faculty members and students. Several eminent mathematicians visit the Department from time to time and collaborate with the faculty members of the Department. Research Monographs and Text Books are brought out by well-known international publishers from some of the research experiences of the faculty members.

The Department conducts research in most of the areas in pure, applied and applicable mathematics, including Algebra, Analysis, Topology and Geometry, Computational & Theoretical Fluid Dynamics, Applied Probability and Stochastic Processes, Discrete Mathematics and Theoretical Computer Science.

The department keeps in pace with the advances in technology, by providing its students with separate state-of-the-art computer facilities for the M. Sc/M. Tech. and Ph. D students. The students gain knowledge of various new areas of research using the free Internet facilities made available in their labs. The department also has its own library with a large collection of books.

Program	No. of Students
<b>M.Tech.</b> Industrial Mathematics and Scientific Computing	10
M.Sc.	48
Ph.D.	13
<b>Total</b>	<b>71</b>

## Department of Mechanical Engineering

Mechanical Engineering is one of the major activities in the engineering profession and its principles are involved in the design, study, development and construction of nearly all of the physical devices and systems. Continued research and development have led to better machines and processes helping the mankind. The Department of Mechanical Engineering at IIT Madras is as old as the Institute itself. Its impact on the institute and on society is easily demonstrated by noting the alignment of the department's evolution with key events and technological advances in the India and elsewhere. Today, the department of Mechanical engineering of IIT Madras attracts and features an extraordinary rich diversity and quantity of talented individuals, with nearly 700 undergraduates, 500 graduate students and over 60 faculty members. The impressive array of students makes the department as the largest in the country and one of the largest in Asia. In addition to teaching undergraduate and graduate students, the faculty of Mechanical Engineering actively pursues research through graduate students. The current graduate students include nearly 150 Master of Technology students (M.Tech), 170 Master of Science (by research) students (M.S.) and 300 students pursuing their doctoral programme (Ph.D).

Program	No. of Students
B.Tech.	82
<b>Dual Degree</b>	
Intelligent Manufacturing	19
Mechanical Engineering	28
Thermal Engineering	31
<b>M.Tech.</b>	
Thermal Engineering	18
Manufacturing and Precision Engineering	15
Mechanical Design	20
M.S.	142
Ph.D.	88
<b>Total</b>	<b>443</b>

### **Department of Metallurgical & Materials Engineering**

The Department of Metallurgical and Materials was established in 1959 as Department of Metallurgy and was renamed as Department of Metallurgical and Materials Engineering in 2003. The department has 30 dynamic faculty members, with their teaching, research and consultancy activities in various areas ranging from conventional metallurgy to frontiers of materials science. The department offers B.Tech, M.Tech, M.S and PhD degrees. The department continues to strive for excellence and realising its vision of becoming a leading department in the country for teaching, research and consultancy in the emerging areas of material science and engineering while consolidating its strength in traditional areas of metallurgical engineering.

<b>Program</b>	<b>No. of Students</b>
B.Tech.	31
Dual Degree	13
M.Tech.	19
M.S.	10
Ph.D.	30
<b>Total</b>	<b>103</b>

## Department of Ocean Engineering

The Department of Ocean Engineering was created in 1982 with the following objectives:

- To create infrastructure and expertise in order to carry out R & D work in areas of Ocean Engineering and related fields, which have direct relevance in the national context.
- To create educational and research opportunities at graduate and doctoral levels.
- To extend educational facilities and train the manpower from industry, R & D organizations and other educational institutions in order to enable them to carry out tasks in areas of Ocean Engineering.
- To collaborate with user organizations on need based problems.

The Department vigorously pursues activities in line with its objectives and remains committed to excellence in its endeavor in education, research and training programs as well as supporting developmental efforts of marine industries. The department has got expertise in Naval Architecture, Wave-structure interaction, Hydrodynamics of offshore structures, Port and harbor structures, Coastal structures, processes and shore protection, Subsea pipelines, risers and cables, Remote sensing, ocean optics and underwater acoustics, Ocean renewable energy, Offshore structural engineering and Marine Instrumentation.

Program	No. of Students
B. Tech in Naval Architecture and Ocean Engineering	32
<b>Dual Degree</b>	
B. Tech in Naval Architecture and Ocean Engineering and M. Tech in Applied Mechanics	9
B. Tech & M. Tech in Naval Architecture and Ocean Engineering	8
<b>M. Tech</b>	
Ocean Engineering	11
Ocean Technology	8
Petroleum Engineering	7
Offshore Structures	10
M.S.	10
Ph.D.	8
<b>Total</b>	<b>103</b>

## Department of Physics

The Department of Physics at IIT Madras consists of 52 faculty members with diverse research interests encompassing many areas of theoretical physics and material science. The department offers programs at undergraduate, Master's, and Doctoral levels. The B.Tech program in "Engineering Physics" is a unique combination of Physics and Electrical Engineering. The BS-MS Dual Degree program in Physics and the M.Tech program in Functional Materials and Nanotechnology with one year research project requirement as well as the M.Sc Physics program prepares students well for a career in research and industry. The Ph.D program offers several exciting frontier areas of research including theory, experiments and applications.

<b>Program</b>	<b>No. of Students</b>
B.Tech (Engineering Physics)	30
<b>Dual Degree</b> Dual Degree (B.S. & M.S.) Physics	11
<b>M.Tech</b> Functional Materials and Nanotechnology	09
M.Sc.	42
Ph.D.	39
<b>Total</b>	<b>131</b>