



Dr. Vishwanath Karad

**MIT WORLD PEACE
UNIVERSITY** | PUNE

TECHNOLOGY, RESEARCH, SOCIAL INNOVATION & PARTNERSHIPS

SYLLABUS

DR VISHWANATH KARAD
MIT - WORLD PEACE UNIVERSITY

FACULTY OF MECHANICAL ENGINEERING

M. TECH. (MECHANICAL ENGINEERING)

Specialization: Design Engineering

BATCH – 2019-20

(Dr. Shrihari Honwad)
(Dean, Engineering)



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PROGRAMME STRUCTURE

Preamble:

MIT-WPU has a proud legacy of well-established School of Mechanical Engineering for 34 years since 1983. The school is well equipped with state-of -the-art laboratories and latest software for modelling, analysis and simulation. School of Mechanical Engineering has developed specialized laboratories in the field of Tribology, Stress Analysis, Solar-Thermal engineering and CFD. School enjoys strong industry connect with core mechanical industries in and around Pune

The School of Mechanical Engineering offers very focused and specialized masters programs (M. Tech.) in three specializations. One of the important objectives of these programs is to create Industry ready professionals who will provide solutions, analyze and research and contribute in Research and Development of product and systems. At MIT-WPU, emphasis is given on providing appropriate skills to meet the ever changing needs of Mechanical and Allied industry at both national and international levels. M. Tech empowers you to design, develop and up-grade systems and processes in every walk of human life.

Two Year Full-time Masters programs comprises of core courses, electives, seminars, peace related courses and a dissertation along with the internship. The students are offered wide variety of electives so that they become industry ready and get specialized in the areas of their choice.

The M. Tech. students are also involved as Teaching Assistants for teaching undergraduate students and for research. While studying theory courses, the students undergo laboratory practice for the courses they have studied. In addition to regular electives taught in the classes, along with M. Tech. dissertation, the students choose open electives of their choice to sharpen their skills. The students can either take up full-time research project or Industry project or combination of these for two trimesters.

Our entire curriculum is designed to evolve with time through what we call CUEd (Continuously Updated Education System). CUED allows us to remain responsive to changing industry needs and that makes our post graduate programs most industry-relevant and sought after.

Prof. Suhasini Desai

Chairman, BoS in Mechanical Engineering
Professor, School of Mechanical Engineering

Dr. Shrihari Honwad

Dean, Engineering



Vision and Mission of the Programme

VISION

To be recognized as a centre of educational excellence in the field of Mechanical Engineering with a strong foundation of social and professional ethics.

MISSION

To produce responsible Mechanical Engineering Graduates by providing them strong fundamentals, team building skills, and professional values in a vibrant learning environment.

Programme Educational Objectives

- PEO-1** Demonstrate the ability to design and develop products, systems and processes in multidisciplinary engineering environment.
- PEO-2** Demonstrate abilities to offer solutions to engineering problems.
- PEO-3** Continue professional development through self-learning and higher education.
- PEO-4** Pursue successful careers at global level.

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(Dean, Engineering)

Programme Outcomes (POs)

- **PO-1** An ability to apply knowledge of mathematics, science, and engineering for the solution of complex chemical engineering problems.
- **PO-2** An ability to identify, formulate and analyse complex engineering problems leading to substantiated conclusions through reviewing literature and applying first principles of mathematics, natural sciences and engineering sciences.
- **PO-3** An ability to obtain a feasible solution to complex chemical engineering problems through design of a system, component or process to meet desired needs within realistic constraints such as economic, environmental, health, safety and sustainability.
- **PO-4** An ability to conduct investigations of complex problems.
- **PO-5** An ability to use techniques, skills and modern engineering tools for modelling and simulation of complex engineering activities.
- **PO-6** An ability to apply contextual knowledge for the assessment of health, safety, societal and regulatory issues relevant to the engineering practice.
- **PO-7** An ability to understand the impact of engineering solutions in a global, economic, environmental and societal context and need for sustainable development.
- **PO-8** An ability to become a responsible professional following ethical principles and norms of the engineering practice.
- **PO-9** An ability to function effectively in the professional environment as an individual and as a member or leader of multidisciplinary teams.
- **PO-10** An ability to communicate effectively on complex engineering activities with the engineering community and society at large.
- **PO-11** An ability to apply engineering and management principles in multidisciplinary projects.
- **PO-12** Recognition of the need for, and an ability to engage in life-long learning to keep abreast with the emerging technologies.

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Programme Specific Outcomes

- **PSO-I** To design and simulate product, systems and processes by applying concepts of mathematics, basic and engineering sciences.
- **PSO-II** To formulate, model, analyze and realize thermal systems across various disciplines.
- **PSO-III** To select, design and apply appropriate contemporary manufacturing processes to realize engineering systems in multidisciplinary environment.

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Programme Structure:

(a) **Programme duration:** Two years.

(b) **System followed:** Trimester

(c) **Credits System:**

Total credits for M.Tech. Programme are decided as 68 and each credit corresponds to 15 contact hours in classroom. Three theory lectures [One hour classroom sessions] per week correspond to 2 credits. For laboratory sessions, two contact hours per week for 12 weeks makes for one credit

(i) 35 for First and 33 for second year

(ii) Total 68 credits in the programme

(d) **Internship:**

Summer industrial training has been a part of engineering education for a long time. MIT-WPU insists on one trimester summer internship either in industry or in an R&D organization, including educational institutes with excellent research culture. The student is expected to submit a formal report at the end of the programme.

(e) **Assessment Criteria:**

For a typical subject having 2 Credits for Theory Class and 1 Credit for Laboratory Practice, assessment of the course will have three components:

1. Class Continuous Assessment (CCA) (50Marks)
2. Laboratory Continuous Assessment (LCA) (50Marks)
3. End of the Term Test (ETT) (50Marks)

Student will be considered eligible for appearing in ETT if and only if he/she has scored above 20 independently in LCA and CCA each.

The final grade for the course will be derived from the total score in the above three components normalized on 10 point scale.

That is, Grade Point in a Subject = (Total of CCA+ LCA +ETT/ 150)*10

Typically, CCA will have Attendance/Initiative, Assignments, Mid-term Test and Group Activity as components; but they may vary as per the requirement of the course.

There will be continuous assessment of a student's performance throughout the trimester and grades will be awarded by the Subject Teacher / Coordination Committee formed for this purpose. The following should be taken as a guideline to ensure uniformity of grading among all courses.

1. For arriving at a grade obtained by a student for a particular subject, initially a numeric marks obtained by the student out of 150 is to be determined and then, the same is to be converted to letter grade.
2. For theory subjects, the subcomponents and the respective weights assigned to these are given below.

Subcomponent	Weight
Laboratory Continuous Assessment	33.3%
Class Continuous Assessment	33.3%
End-Term Test	33.3%

The assessment Marks are valid only if Attendance criteria are met.

3. For assigning marks in Teacher's Assessment (T.A.), performance in home assignments, class tests, tutorials, viva-voce, attendance etc. are to be considered. It is recommended that at least two class tests for 4 credit theory courses and 1 test for 3 credit theory courses are to be conducted for a subject.
The weights of different subcomponents of T.A. may be announced to the students by the teacher at the beginning of the trimester.
4. For assignment of marks in the laboratory component, the relevant subcomponents that are to be considered are: day-to-day work, regularity, assignments and viva-voce etc. Percentage weights of the different subcomponents in deciding the final marks are to be announced at the beginning of the trimester. The evaluation process must be completed before the beginning of end trimester examination.
5. To the extent possible, laboratory work should be completed and evaluated every class thus ensuring continuous evaluation. Final examination and/or viva voce, if any, may not carry more than 20% marks.

**(f) Mandatory Attendance to appear for examination: 75%,
(Para 13.1. of Academic Ordinance: 2017)**

It is expected on the part of the student to attend each and every Lecture, Tutorial, and Laboratory practical sessions in a course for the academic excellence. However, due to any

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Contingencies, the attendance requirement will be a minimum of 75% of the classes scheduled/ held.

(g) Medium of Instruction & Examination: English (Para 9 of Academic Ordinance: 2017)

In all the Academic Programs, the medium of instruction and examination shall be English.

(h) Eligibility criteria for admission to the programme (as per para 4 of Academic Ordinance: 2017)

i) Passed Bachelor's Degree in relevant field of Engineering and Technology awarded by the University recognized by University Grants Commission or Association of Indian

Universities in any discipline with at least **55% marks** in aggregate or equivalent (Candidates belonging to the Scheduled Castes/Scheduled Tribes who have passed the basic qualifying degree (bachelor's degree in engineering), are eligible to apply irrespective of the marks/CPI and will be considered for admission.)

AND

Obtained non-zero positive score in Graduate Aptitude Test in Engineering (**GATE**) conducted by Indian Institute of Technology.

OR

ii) For sponsored candidate, minimum **two years** of full timework experience in a registered firm / company/ industry/ educational and/or research institute / any Government Department or Government Autonomous Organization in the relevant field in which admission is sought.

UG Eligibility(B.E./B.Tech.)

(GATE score of 2019 and 2018 exam will be considered for admission for 2019-2020)

Automobile Engineering, Production Engineering, Mechanical Engineering, Mechanical Engineering[Sandwich], Production Engineering[Sandwich], Sugar Engineering

GATE Eligibility

Mechanical Engineering (ME)

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M. Tech Courses in Mechanical Engineering – Design Engineering
2019-20

A. Definition of Credit:-

3 Hr.Lecture / Tutorial per week	2credits
2HoursPractical(Lab) per week	1credit

B. Credits:-

Total number of credits for two year graduate **M.Tech.Mechanical – Design Engineering** Programme would be **68**.

C. Structure of Credits for graduate M. Tech. program:-

S. No.	Category	Suggested Breakup of Credits (Total 68)
1	Humanities and Social Sciences and Peace Programmes including Management courses	8
2	Basic Science courses	-
3	Engineering Science courses including workshop, drawing,	-
4	Professional core courses	14(Th.) +12 (Lab)
5	Professional Elective courses relevant to chosen specialization/branch	8
6	Open subjects–Electives from other technical and/or emerging	02
7	Project work, seminar and internship in industry or elsewhere	24
	Total	68

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D. Course code and definition:-

Coursecode	Definitions
L	Lecture
T	Tutorial
ES	EngineeringScienceCourses
WP	Humanities and Social Sciences and Peace Programs including Management courses
ME	Mechanical Engineering Courses
EC	Electronics and Communication
EE	Electrical Engineering
CH	Chemical Engineering
CS	Computer Science and Engineering
PO	Polymer Engineering
CE	Civil Engineering
PE	Petroleum Engineering

E. Grading Scheme:

(According to Para 12.1 of Academic Ordinances 2017)

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M. Tech. Mechanical Design Engg (First Year) (Batch 2019-20)
Trimester – I

Sr. No.	Course Code	Name of Course	Type	Weekly Workload, Hrs			Credits		Assessment Marks**			
				Theory	Tutorial	Lab	Th	Lab	CCA*	LCA*	End Term Test	Total
1	MED511	Research Methodology	Core	3	-	-	2	-	50	-	50	100
2	MED512	Advanced Mathematical Methods	Core	3	-	-	2	-	50	-	50	100
3	MED513	Advanced Stress Analysis	Core	3	-	-	2	-	50	-	50	100
4	WPC1	World Famous Philosophers, Sages/Saints and Great Kings	WPC	3	-	-	2	-	70	-	30	100
5	MED514	Lab Practice-I	Core	-	-	6	-	3	-	50	50+	100
6	WPC3	Yoga – for Winning Personality	WPC	-	-	-	-	-	-	-	-	-
Total :				12	-	6	8	3	220	50	230	500

Type: (Refer Para 11 of Academic Ord. 2017)

Weekly Teaching Hours: 18

Total Credits: First Year M. Tech Trimester I: 11

****Assessment Marks are valid only if Attendance criteria are met**

*CCA: Class Continuous Assessment

*LCA: Laboratory Continuous Assessment

*Oral examination

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(Dr. P D. Khandekar)
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M. Tech. Mechanical Design Engg (First Year) (Batch 2019-20)
Trimester – II

Sr. No.	Course Code	Name of Course	Type	Weekly Workload, Hrs			Credits		Assessment Marks **			
				Theory	Tutorial	Lab	Th	Lab	CCA*	LCA*	End Term Test	Total
1	MED521	Advanced Mechanical Vibrations	Core	3		-	2	-	50	-	50	100
2	MED522	Analysis and Synthesis of Mechanisms	Core	3		-	2	-	50	-	50	100
3	MED523	Elective-I	Elective	3		-	2	-	50	-	50	100
4	WPC4	Philosophy of Science and Religion/Spirituality	WPC	3		-	2	-	70	-	30	100
5	MED524	Lab Practice-II	Core	-		6	-	3	-	50	50*	100
6	WPC3	Yoga – for Winning Personality	WPC	-		-	-	-	-	-	-	-
Total :				12		6	8	3	220	50	230	500

Type: (Refer Para 11 of Academic Ord. 2017)

Weekly Teaching Hours: 18

Total Credits: First Year M. Tech Trimester II: 11

****Assessment Marks are valid only if Attendance criteria are met**

*CCA: Class Continuous Assessment

*LCA: Laboratory Continuous Assessment

*Oral examination

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M. Tech. Mechanical Design Engg (First Year) (Batch 2019-20)
Trimester – III

Sr. No.	Course Code	Name of Course	Type	Weekly Workload, Hrs			Credits		Assessment Marks**			
				Theory	Tutorial	Lab	Th	Lab	CCA*	LCA*	End Term Test	Total
1	MED531	Industrial Tribology	Core	3		--	2	-	50	-	50	100
2	MED532	Elective-II	Elective	3		--	2	-	50	-	50	100
3	MED533	Elective-III	Elective	3		--	2	-	50	-	50	100
4	WPC2	Study of Languages, Peace in Communications and Human Dynamics	WPC	3		--	2	-	70	-	30	100
5	MED534	Lab Practice-III	Core	-		6	-	3	-	50	50 ⁺	100
6	MED535	Study Project	Core	-		4	-	2	-	50	50 ⁺	100
	WPC3	Yoga – for Winning Personality	WPC	-		-	-	-	-	-	-	-
		Total :		12		10	8	5	220	100	280	600

Type: (Refer Para 11 of Academic Ord. 2017) **Assessment Marks are valid only if Attendance criteria are met

Weekly Teaching Hours: 22

Total Credits: First Year M. Tech. Trimester III: 13

Total First Year M. Tech Credits: 35

* CCA: Class Continuous Assessment

*LCA: Laboratory Continuous Assessment

*Oral examination

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M. Tech. Mechanical Design Engg (Second Year) (Batch 2019-20)

Trimester – IV

Sr. No	Course Code	Name of Course	Type	Weekly Workload, Hrs			Credits		Assessment Marks**			
				Theory	Tutorial	Lab	Th	Lab	CCA*	LCA*	End Term Test	Total
1	MED611	Optimization Techniques	Core	3	-	-	2	-	50	-	50	100
2	MED612	Finite Element Method	Core	3	-	-	2	-	50	-	50	100
3	MED613	Elective-IV	Elective	3	-	-	2	-	50	-	50	100
4	MED614	Project Stage-I	Core	-	-	4	-	2	-	50	50*	100
5	MED615	Lab Practice-IV	Core	-	-	6	-	3	-	50	50*	100
Total :				9	-	10	6	5	150	100	250	500

Type: (Refer Para 11 of Academic Ord. 2017)

Weekly Teaching Hours: 19

Total Credits: Second Year M. Tech. Trimester IV: 11

****Assessment Marks are valid only if Attendance criteria are met**

* CCA: Class Continuous Assessment

*LCA: Laboratory Continuous Assessment

*Oral examination

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M. Tech. Mechanical Design Engg (Second Year) (Batch 2019-20)
Trimester – V

Sr. No	Course Code	Name of Course	Type	Weekly Workload, Hrs			Credits		Assessment Marks**			
				Theory	Tutorial	Lab	Th	Lab	CCA*	LCA*	End Term Test	Total
1	MED621	Elective-V	Self-study	2		-	1	-	-	-	50	50
2	MED622	Project Stage-II	Core	-		20	-	10	-	100	50+	150
		Total :		2		20	1	10	-	100	100	200

Type: (Refer Para 11 of Academic Ord. 2017)

Weekly Teaching Hours: 22

Total Credits: Second Year M. Tech. Trimester V: 11

****Assessment Marks are valid only if Attendance criteria are met**

* CCA: Class Continuous Assessment

*LCA: Laboratory Continuous Assessment

*Oral examination

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M. Tech. Mechanical Design Engg (Second Year) (Batch 2019-20)

Trimester – VI

Sr. No.	Course Code	Name of Course	Type	Weekly Workload, Hrs			Credits		Assessment Marks**			
				Theory	Tutorial	Lab	Th	Lab	CCA*	LCA*	End Term Test	Total
1	MED631	Elective-VI	Self-study ^{\$}	2 [@]		-	1	-	-	-	50	50
2	MED632	Project Stage-III	Core	-		20	-	10	-	100	100*	200
		Total :		2 [@]		20	1	10	-	100	150	250

Type: (Refer Para 11 of Academic Ord. 2017)

Weekly Teaching Hours: 22

Total Credits: Second Year M. Tech. Trimester VI: 11

Total Second Year M. Tech Credits: 33

****Assessment Marks are valid only if Attendance criteria are met**

* CCA: Class Continuous Assessment

*LCA: Laboratory Continuous Assessment

*Oral Examination

^{\$}Students have to submit certificate based on MOOC/Online courses/Online industrial case study at the end of Term

[@] Weekly contact Hrs with concerned subject teacher

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Elective Courses:

Elective	Code	Title	Code	Title	Code	Title	Code	Title
MED523: Elective-I	MED523A	Project Management & Operations Research	MED523B	Engineering Management	MED523C	Human Rights and Safety	MED523D	Technology Transfer and IPR
MED532: Elective-II	MED532A	Process Equipment Design	MED532B	Design of Experiments	MED532C	Design of Material Handling Equipment	MED532D	MEMS
MED533: Elective-III	MED533A	Reliability Engineering	MED533B	Vehicle Dynamics	MED533C	Product Design and PLM	MED533D	Mechanics of Composite Materials and Structure
MED613: Elective-IV	MED613A	Robotics	MED613B	NVH & Condition Monitoring	MED613C	Design for X	MED523D	Mechanical Measurements and Controls
MED621: Elective-V*	MED621A	Fatigue & Fracture Mechanics	MED621B	Theory of Shells & Plates	MED621C	Advanced Mechanics of Solids	MED621D	Design of Mechatronics System
MED631: Elective-VI*	MED631A	Artificial Intelligence	MED631B	Smart Materials	MED631C	Design of Machine Tools	MED631D	System Modeling & Simulation

*Self-Study Elective subjects (End Term theory examination for 50 marks, duration 3 Hrs.)

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Year of Study	Trimester	Credits (Theory)	Credits (Practical)	Total Credits	Total Marks
First Year M.Tech. (Mechanical-Design Engineering)	I	8	3	11	500
	II	8	3	11	500
	III	8	5	13	600
Second Year M.Tech. (Mechanical-Design Engineering)	IV	6	5	11	500
	V	1	10	11	200
	VI	1	10	11	250
Total		32	36	68	2550

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