Rashtrasant Tukadoji Maharaj Nagpur University
Faculty of Science and Technology

Curriculum for Undergraduate Degree Course

In

B. Tech. (Fire Engineering)

(Choice Based Credit System)

Program Outcomes (PO): Engineering Graduates will be able to:

PO1. **Engineering knowledge:** An ability to apply knowledge of mathematics, science and engineering fundamentals to the solution of fire engineering problems.

PO2. **Problem Analysis:** An ability to design and conduct experiments, as well as to analyse and interpret data.

PO3. **Design and Development of Solution:** An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

PO4. **Conduct investigation of Complex problems:** Knowledge of research methodology, data interpretation to provide valid conclusion of contemporary issues.

PO5. **Modern Tool Usage:** An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

PO6. **The Engineer and Society:** An ability to apply reasoning informed by the contextual knowledge to assess health, safety and cultural issues relevant to the professional engineering practices.

PO7. **Environmental and Sustainability:** The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context.

PO8. **Ethics:** Apply ethical principles, commit to professional ethics, discipline and responsibilities of engineering practice.

PO9. **Individual and Team Work:** An ability to function on multidisciplinary teams.

PO10. **Communication:** An ability to communicate effectively.

PO11. **Project management and Finance:** An ability to demonstrate knowledge and understanding of engineering and management principles and application to the project work.

PO12. **Life-long learning:** Recognition of the need for, and an ability to engage in lifelong learning.

General, Course Structure, Theme & Semester-wise credit distribution

A. Definition of Credit

Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
1 Hr. Practical (P) per week	0.5 credits
2 Hours Practical (Lab)/week	1 credit

B. **Range of credits:** A range of credits from 150 to 160 for a student to be eligible to get Under Graduate degree in Engineering. A student will be eligible to get Under Graduate degree with Honours or additional Minor Engineering, if he/she completes an additional 20 credits. These could be acquired through MOOCs.

C. Course code and definition:

Course Code	Definition
BSC	Basic Science Courses
ESC	Engineering Science Courses
HSMC	Humanities and Social Sciences Including Management courses
PCC	Professional core courses
PEC	Professional Elective courses
OEC	Open Elective courses
Project	Project work, seminar, internship and training in industry

D. Structure of Undergraduate Engineering program:

Sr. No.	Category	Breakup of Credit
1	Humanities and Social Science including Management Course	**06**
2	Basic Science Couse	**42**
3	Engineering Science Course	**35**
4	Professional Core Course	**60.5**
5	Professional Elective Course	**2**
6	Open Elective Course	**2**
7	Project	**12.5**
8	Mandatory (Audit) Courses	**Non-Credit**
	Total Program Credits	**160**

E. Summary of Assessment and Credits for Undergraduate Engineering program:

Sr. No.	Semester	Examination			Credits
		Internal Assessment	University Assessment	Total	
1	Semester - I	220	380	600	19.5
2	Semester - II	260	440	700	22.5
3	Semester - III	250	450	700	22.5
4	Semester - IV	250	450	700	22.5
5	Semester - V	280	520	800	22.5
6	Semester - VI	280	520	800	22.5
7	Semester - VII	275	425	700	18
8	Semester - VIII	200	300	500	10
Total		**2015**	**3485**	**5500**	**160**

Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur
Four Years B.Tech. Fire Engineering (Choice Based Credit System)

Semester – I (First Year)

Branch: Fire Engineering

First Semester

Sub Code	Subjects	Working in hrs			Credits	Marks					Minimum Passing Marks	
						Theory		Practical		Total		
		L	T/A	P		Int	Uni	Int	Uni		Theory	Practical
BSE1-1T	Mathematics –I	3	1	–	4	30	70	–	–	100	45	–
BSE1-2T	Applied Physics	3	2	–	4	30	70	–	–	100	45	–
BSE1-3T	Energy and Environment	2	2	–	3	30	70	–	–	100	45	–
BSE1-4T	Communication Skills	2	–	–	2	15	35	–	–	50	23	–
BSE1-5T	Engineering Graphics	1	–	–	1	15	35	–	–	50	23	–
BSE1-6T	Basics of Civil & Mechanical Engineering	4	–	–	Audit	50		–	–	Audit	–	–
BSE1-2P	Applied Physics Lab	–	–	3	1.5	–	–	25	25	50	–	25
BSE1-3P	Energy and Environment Lab	–	–	2	1	–	–	25	25	50	–	25
BSE1-4P	Communication Skills Lab	–	–	2	1	–	–	25	25	50	–	25
BSE1-5P	Engineering Graphics Lab	–	–	4	2	–	–	25	25	50	–	25
BSE1-6P	Fire Ground Operation – I	–	–	5	Audit	Grade System (Guidelines Mentioned in Detailed Syllabus)				Audit	–	–
Three weeks Induction Program											–	–
Total		**15**	**11**		**19.5**	**120***	**280**	**100**	**100**	**600**		

* L- Lecture, P- Practical, T- Tutorial, A- Activity (Half Credit Per Hour)

Semester – II (First Year)
Branch: Fire Engineering

Second Semester

Sub Code	Subjects	Work Load (Hours)			Credits	Marks					Minimum Passing Marks	
		L	T/A	P		Theory		Practical		Total		
						Int	Uni	Int	Uni		Theory	Practical
BSE2-1T	Mathematics –II	3	1	–	4	30	70	–	–	100	45	–
BSE2-2T	Advanced Engineering Materials	2	2	–	3	30	70	–	–	100	45	–
BSE2-3T	Applied Chemistry	3	2	–	4	30	70	–	–	100	45	–
BSE2-4T	Computational Skills	2	–	–	2	15	35	–	–	50	23	–
BSE2-6T	Basics of Electrical Engineering	2	–	–	2	15	35	–	–	50	23	–
BSE2-7T	Engineering Mechanics	2	–	–	2	15	35	–	–	50	23	–
BSE2-8T	Indian Culture & Constitution	2	–	–	Audit	50	–	–	–	Audit	–	–
BSE2-1P	Workshop Practices	–	–	4	2	–	–	50	50	100	–	50
BSE2-2P	Advanced Engineering Materials	–	–	2	1	–	–	25	25	50	–	25
BSE2-3P	Applied Chemistry	–	–	3	1.5	–	–	25	25	50	–	25
BSE2-4P	Computational Skills	–	–	2	1	–	–	25	25	50	–	25
BSE2-5P	Fire Ground Operation - II	–	–	5	Audit	Grade System (Guidelines Mentioned in Detailed Syllabus)				Audit	–	–
Three weeks Induction Program												
Total		**16**	**5**	**16**	**22.5**	**135***	**315**	**125**	**125**	**700**		

L- Lecture, P- Practical, T- Tutorial, A- Activity (Half Credit Per Hour)

*Audit course marks are not counted in total marks

Guidelines

* Energy and Environment shall be taught by faculty of chemistry and will come under board of Applied Science and Humanities (only by Chemistry Dept)

* Advance Engineering Materials shall be taught by faculty of chemistry; Physics and will come under board of Applied Science and Humanities (only by Physics Dept)

Semester – III (Second Year)

Branch: Fire Engineering

Third Semester:

Subject Code	Subjects	Work Load (Hours)			Credits	Marks					Minimum Passing Marks	
						Theory		Practical		Total		
		L	T/A	P		Int	Uni	Int	Uni		Theory	Practical
ESC-FE-201	Fluid Mechanics	2	1	–	3	30	70	–	–	100	45	–
ESC-FE-202	Advanced Electrical Systems	2	1	–	3	30	70	–	–	100	45	–
ESC-FE-203	Structural Mechanics	3	1	–	4	30	70	–	–	100	45	–
ESC-FE-204	Engineering Thermodynamics	3	1	–	4	30	70	–	–	100	45	–
HSMC-FE-201	Universal Human Values – II	2	1	–	3	30	70	–	–	100	45	–
ESC-FE-201(P)	Fluid Mechanics Laboratory	–	–	2	1	–	–	25	25	50	–	25
ESC-FE-202(P)	Advanced Electrical Systems Laboratory	–	–	2	1	–	–	25	25	50	–	25
ESC-FE-203(P)	Structural Mechanics Laboratory	–	–	2	1	–	–	25	25	50	–	25
PCC-FE-201(P)	Fire Ground Operations – III	–	–	5	2.5	–	–	25	25	50	–	25
Total		**12**	**5**	**11**	**22.5**	**150**	**350**	**100**	**100**	**700**		

* L- Lecture, P- Practical, T- Tutorial, A- Activity (Half Credit Per Hour)

Semester – IV (Second Year)

Branch: Fire Engineering

Fourth Semester:

Subject Code	Subjects	Work Load (Hours)			Credits	Marks					Minimum Passing Marks	
						Theory		Practical		Total		
		L	T/A	P		Int	Uni	Int	Uni		Theory	Practical
PCC-FE-202	Fire Service Hydraulics	2	1	–	3	30	70	–	–	100	45	–
ESC-FE-205	Heat and Mass Transfer	3	1	–	4	30	70	–	–	100	45	–
ESC-FE-206	Basic Electronics and Communication	3	1	–	4	30	70	–	–	100	45	–
PCC-FE-203	Fundamentals of Fire Engineering	3	–	–	3	30	70	–	–	100	45	–
PCC-FE-204	Structural Fire Protection	3	–	–	3	30	70	–	–	100	45	–
PCC-FE-202(P)	Fire Service Hydraulics Laboratory	–	–	2	1	–	–	25	25	50	–	25
ESC-FE-205(P)	Heat and Mass Transfer Laboratory	–	–	2	1	–	–	25	25	50	–	25
ESC-FE-206(P)	Basic Electronics and Communication Laboratory	–	–	2	1	–	–	25	25	50	–	25
PCC-FE-205(P)	Fire Ground Operations – IV	–	–	5	2.5	–	–	25	25	50	–	25
Total		**14**	**3**	**11**	**22.5**	**150**	**350**	**100**	**100**	**700**		

* L- Lecture, P- Practical, T- Tutorial, A- Activity (Half Credit Per Hour)

Semester – V (Third Year)

Branch: Fire Engineering

Fifth Semester:

Subject Code	Subjects	Work Load (Hours)			Credits	Marks					Minimum Passing Marks	
						Theory		Practical		Total		
		L	T/A	P		Int	Uni	Int	Uni		Theory	Practical
PCC-FE-301	Fire Dynamics	2	1	–	3	30	70	–	–	100	45	–
ESC-FE-301	Automobile Engineering	3	–	–	3	30	70	–	–	100	45	–
ESC-FE-302	Instrumentation and Control	2	1	–	3	30	70	–	–	100	45	–
PCC-FE-302	Fire Protection	2	1	–	3	30	70	–	–	100	45	–
HSMC-FE-301	Fundamentals of Management	3	–	–	3	30	70	–	–	100	45	–
PCC-FE-303	Fire Laws	2	–	–	2	30	70	–	–	100	45	–
PCC-FE-301 (P)	Fire Dynamics Laboratory	–	–	2	1	–	–	25	25	50	–	25
ESC-FE-301 (P)	Automobile Engineering Laboratory	–	–	2	1	–	–	25	25	50	–	25
ESC-FE-302 (P)	Instrumentation and Control Laboratory	–	–	2	1	–	–	25	25	50	–	25
PCC-FE-304 (P)	Fire Ground Operations – V	–	–	5	2.5	–	–	25	25	50	–	25
Total		**14**	**3**	**11**	**22.5**	**180**	**420**	**100**	**100**	**800**		

* L- Lecture, P- Practical , T- Tutorial, A- Activity (Half Credit Per Hour)

Semester – VI (Third Year)

Branch: Fire Engineering

Sixth Semester:

Subject Code	Subjects	Work Load (Hours)			Credits	Marks					Minimum Passing Marks	
						Theory		Practical		Total		
		L	T/A	P		Int	Uni	Int	Uni		Theory	Practical
PCC-FE-305	Fixed Fire Fighting Installations	2	1	–	3	30	70	–	–	100	45	–
PCC-FE-306	Paramedics	2	1	–	3	30	70	–	–	100	45	–
PCC-FE-307	Fire Modelling	2	1	–	3	30	70	–	–	100	45	–
PCC-FE-308	Fundamentals of Industrial Safety and Health	2	1	–	3	30	70	–	–	100	45	–
PCC-FE-309	Fire Codes and Standards	3	–	–	3	30	70	–	–	100	45	–
PCC-FE-310	Fire and Life Safety Audit	2	–	–	2	30	70	–	–	100	45	–
PCC-FE-305 (P)	Fixed Fire Fighting Installations Laboratory	–	–	2	1	–	–	25	25	50	–	25
PCC-FE-306 (P)	Paramedics Laboratory	–	–	2	1	–	–	25	25	50	–	25
PCC-FE-307 (P)	Fire Modelling Laboratory	–	–	2	1	–	–	25	25	50	–	25
PCC-FE-311 (P)	Fire Ground Operations – VI	–	–	5	2.5	–	–	25	25	50	–	25
Total		**13**	**4**	**11**	**22.5**	**180**	**420**	**100**	**100**	**800**		

* L- Lecture, P- Practical , T- Tutorial, A- Activity (Half Credit Per Hour)

Semester – VII (Fourth Year)

Branch: Fire Engineering

Seventh Semester:

Subject Code	Subjects	Work Load (Hours)			Credits	Marks					Minimum Passing Marks	
						Theory		Practical		Total		
		L	T/A	P		Int	Uni	Int	Uni		Theory	Practical
PCC-FE-401	Fire and Arson Investigation	2	1	–	3	30	70	–	–	100	45	–
PCC-FE-402	Fire Risk Assessment	3	–	–	3	30	70	–	–	100	45	–
PCC-FE-403	Special Hazards	3	–	–	3	30	70	–	–	100	45	–
PEC-FE-(401-404)	**Elective-I** 401-Nuclear Reactors and Safety 402-Chemical Process Safety 403-Occupational Health & Hygiene Management 404-Disaster Management	2	–	–	2	30	70	–	–	100	45	–
OEC-FE-(401-404)	**Open Elective – I** 401-Robotics 402-Cyber Security 403-Internet of Thing 404-Artificial Intelligence	2	–	–	2	30	70	–	–	100	45	–
PROJ-FE-401 (P)	Mini Project	–	–	5	2.5	–	–	50	50	100	–	50
PCC-FE-404 (P)	Fire Ground Operation -VII	–	–	5	2.5	–	–	25	25	50	–	25
MC-FE-401 (P)	Summer Internship	–	–	–	Audit	–	–	50	–	50	–	25
Total		**12**	**1**	**10**	**18**	**150**	**350**	**125**	**75**	**700**		

* L- Lecture, P- Practical , T- Tutorial, A- Activity (Half Credit Per Hour)

Semester – VIII (Fourth Year)

Branch: Fire Engineering

Eight Semester:

Subject Code	Subjects	Work Load (Hours)			Credits	Marks					Minimum Passing Marks	
						Theory		Practical		Total		
		L	T/A	P		Int	Uni	Int	Uni		Theory	Practical
PROJ-FE-402 (P)	Industrial Training and Attachment	–	–	20	10	-	-	200	300	500	–	250
Total		**0**	**0**	**0**	**10**	**-**	**-**	**200**	**300**	**500**		