**NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI**

**This course outline template acts as a guide for writing your course outline. As every course is different, please feel free to amend the template/ format to suit your requirements.**

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| **COURSE OUTLINE TEMPLATE** | | | | | | | |
| **Course Title** | | | **Fire Engineering and Explosion Control** | | | | |
| **Course Code** | | | **ME 656** | | **No. of Credits** | **3** | |
| **Department** | | | **MECHANICAL** | | **Faculty** | **Dr.M.UDAYAKUMAR** | |
| **Pre-requisites**  **Course Code** | | | **NIL** | | | | |
| **Course Coordinator(s)**  **(if, applicable)** | | | **NIL** | | | | |
| **Other Course**  **Teacher(s)/Tutor(s)**  **E-mail** | | | **NIL** | | **Telephone No.** | **9487257871** | |
| **Course Type** | | | **Core course** | | | | |
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| **COURSE OVERVIEW** | | | | | | | |
| **COURSE OBJECTIVES** | | | | | | | |
| 1. **To learn factors associated with fire initiation and spread. Chemisty, heat and mass transfer**   **Influence on fire initiation and spread.**   1. **Expose the students to issues associated with fire and explosion prevention and control** 2. **Teqniques for fire fighting , suppression and explosion control by design for prevention** 3. **To familiarize with the explosives act, signs for storage and handling and testing of explosion**   **Proof and intrinsically safe devices** | | | | | | | |
| **COURSE OUTCOMES (CO)** | | | | | | | |
| **Course Outcomes** | | | | | | | **Aligned Prog**  **ramme Outcomes (PO)** |
| On completion of the course, the students will be able to:  At the end of the course student will be able to  1. Apply chemistry and physics for study of fire and explosion formation spread and control. 2. Identify the procedure to be adopted to establish at the design stage itself fire control devices and establish exit and egress in buildings.. 3. Get exposure to Indian explosives act, fire safety rules and to area and zone classification to identify suitable hydrants. | | | | | | | **PO-1, PO-2, PO-3,**  **PO-4, PO-5,PO-6,**  **PO-7, PO-8, PO-9,**  **PO-10, PO-11,**  **PO-12** |
| **COURSE TEACHING AND LEARNING ACTIVITIES** | | | | | | | |
| **S.No.** | **Week** | **Topic** | | | | | **Mode of Delivery** |
| **1** | **WEEK-1**  **WEEK-2**  **WEEK-3**  **WEEK-4**    **WEEK-5**    **WEEK-6**  **WEEK-7**  **WEEK-8**  **WEEK-9**  **WEEK-10**  **WEEK-11**  **WEEK-12**  **WEEK-13**  **WEEK-14** | Fire chemistry – Stoichiometry- fire triangle-Factors associated with fire spread LFL, HFL - heat and mass transfer effects  Dynamics of fire behavior – deflagration and detonation-ignition sources- design for prevention  Fire properties of solid, liquid and gas – Fire spread – Toxicity of products of combustion  Vapour cloud explosion- BLEVE- effects on individuals and structure- pressure rise-TNT equivalents and effects-  Fire control in plants- spacing –Purging- standard operating procedure- electric sparks control- static electricity - grounding  Industrial fire protection systems – Sprinkler – Hydrants- Stand pipe- Special fire suppression system like deluge and emulsifier.  Building evaluation for fire safety – Fire load –Fire resistance materials and fire testing – Structural Fire protection – Exits and egress.  Explosion protection systems – Explosion parameters – explosion proof equipment as per IS2148- intrinsically safe equipment design procedure  Explosion suppression system based on CO2 and Halon – Hazards in L.P.G handling.  Statutory Rules and Techniques of fire fighting - Indian Explosive acts and rules –.  Safety in casting of solid propellant rocket motors – Types of explosives- composition and storage and handling  Techniques of firefighting - firefighting demonstration for different class of fires**.** | | | | | **Chalk and Talk**  **and ppts**  **-do-**  **-do-**  **-do-**  **-do-**  **-do-**  **-do-**  **-do-**  **-do-**  **-do-**  **-do-**  -do-  -do- |
| **COURSE ASSESSMENT METHODS** | | | | | | | |
| **S.No.** | **Mode of**  **Assessment** | **Week/Date** | | **Duration** | | | **% Weightage** |
| **1**  **2**  **3**  **4**  **5** | **Cycle Test-1**  **Cycle Test-1**  **Retest**  **Seminars**  **End sem exam** | **7th week**  **10th week**  **12th week**  **7th week – 11th week** | | **1 Hour**  **1 Hour**  **1 Hour**  **3 Hour** | | | **20%**  **20%**  **10%**  **50%**  **Total = 100 Marks** |
| **ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc** | | | | | | | |
| 1. James, D., Fire Prevention Handbook, Butterworths, London, 1986.  2. Gupta R.S., Handbook of Fire Technology, Orient Longman, Bombay, 1997.  3. Fires and Explosions - ppt. by Ray French (ExxonMobil)2003  4. IS 2148- 2004 Electrical Apparatus For Explosive Gas Atmospheres - Flameproof Enclosures "d”  5  5555  5.atus For Explosive Gas Atmospheres - Flameproof Enclosures "d" | | | | | | | |

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| **COURSE EXIT SURVEY (mention the ways in which the feedback about the course is assessed and**  **indicate the attainment also)** |
| 1. **Feedback from students during class committee meeting** 2. **Anonymous feedback through questionnaire ( as followed currently)** |
| **COURSE POLICY (including plagiarism, academic honesty, attendance, etc.)** |
| 1. **Test 1 and Test2 will be conducted in the class. Use of approved Tables and scientific**   **calculator permitted**   1. **75% attendance compulsory for wring the end semester examination** |
| **ADDITIONAL COURSE INFORMATION** |
| **The Faculty is available for consultation after the class hours in the Mech. Engg. Dept. Faculty**  **may also be contacted on mobile : 9487257871** |
| **FOR SENATE’S CONSIDERATION** |
| **Course Faculty \_\_\_\_\_\_\_\_\_\_ CC-Chairperson \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ HOD \_\_\_\_\_\_\_\_\_\_\_\_** |

Course Content

ME 656 – FIRE ENGINEERING AND EXPLOSION CONTROL

Fire chemistry – Dynamics of fire behavior – Fire properties of solid, liquid and gas – Fire spread – Toxicity of products of combustion

Industrial fire protection systems – Sprinkler – Hydrants- Stand pipe- Special fire suppression system like deluge and emulsifier.

Bulding evaluation for fire safety – Fire load –Fire resistance materials and fire testing – Structural Fire protection – Exits and egress.

Explosion protection systems – Explosion parameters – Explosion suppression system based on CO2 and Halon – Hazards in L.P.G handling. Statutory Rules and Techniques of fire fighting –

Indian Explosive acts and rules – Techniques of fire fighting and demonstration.

References 1. James, D., Fire Prevention Handbook, Butterworths, London, 1986.

2. Gupta R.S., Handbook of Fire Technology, Orient Longman, Bombay, 1997.