ALAGAPPA UNIVERSITY

(Accredited with A+ Grade by NAAC (CGPA: 3.64) in the Third Cycle,
Graded as Category-I University and granted autonomy by MHRD-UGC)

DIRECTORATE OF COLLABORATIVE PROGRAMMES

M.Sc Industrial Safety & Hygiene

Regulations and Syllabus

[For those who join the Course in July 2023 and after]

CHOICE BASED CREDIT SYSTEM

GENERAL INSTRUCTIONS AND REGULATIONS

M.Sc Industrial Safety & Hygiene conducted by Alagappa University, Karaikudi, Tamil Nadu through its Collaborative Institutions.

Applicable to all the candidates admitted from the academic year **2023** onwards.

1. **Eligibility:**

   Candidate for admission to **M.Sc Industrial Safety & Hygiene** shall be required to have passed in any **Bachelor of Engineering Discipline, B.Sc Physics / Chemistry, B.Sc Fire & Industrial Safety** bachelor degree with 55% marks from recognized University/Institution.

2. **For the Degree:**

   The candidates shall have subsequently undergone the prescribed programme of study in a institute for not less than two academic years comprising 4 semesters, passed the examinations prescribed and fulfill such conditions as have been prescribed therefore.

3. **Admission:**

   Admission based on the marks in the qualifying examination.

4. **Duration of the course:**

   The course shall extend over a period of two years under semester pattern accounting to four semesters.

5. **Standard of Passing and Award of Division:**
   a. Students shall have a minimum of 50% of total marks of the University examinations in each subject. The overall passing minimum is 50% both in aggregate of Continuous Internal Assessment and external in each subject.
   b. The minimum marks for passing in each theory / Lab course shall be 50% of the marks prescribed for the paper / lab.
   c. A candidate who secures50% or more marks but less than 60% of the aggregate marks, shall be awarded **SECOND CLASS.**
   d. A candidate, who secures 60% or more of the aggregate marks, shall be awarded **FIRST CLASS.**
   e. The Practical / Project shall be assessed by the two examiners, by an internal examiner and an external examiner.

6. **Continuous internal Assessment:**
   a. Continuous Internal Assessment for each paper shall be by means of Written Tests, Assignments, Class tests and Seminars
   b. **25 marks** allotted for the Continuous Internal assessment is distributed for Written Test, Assignment, Class test and Seminars.
   c. Two Internal Tests of 2 hours duration may be conducted during the semester for each course / subject and the best marks may be considered and one Model Examination will be conducted at the end of the semester prior to University examination. Students may be asked to submit at least five assignments in each subject.They should also participate in Seminars conducted for each subject and marks allocated accordingly.

d. Conduct of the continuous internal assessment shall be the responsibility of the concerned faculty.
e. The continuous internal assessment marks are to be submitted to the University at the end of every year.
f. The valued answer papers/assignments should be given to the students after the valuation is over and they should be asked to check up and satisfy themselves about the marks they have scored.
g. All mark lists and other records connected with the continuous Internal Assessments should be in the safe custody of the institution for at least one year after the assessment.

7. Attendance:

- Students must have earned 75% of attendance in each course for appearing for the examination.
- Students who have earned 74% to 70% of attendance to be applied for condonation in the prescribed form with the prescribed fee.
- Students who have earned 69% to 60% of attendance to be applied for condonation in the prescribed form with the prescribed fee along with the medical certificate.
- Students who have below 60% of attendance are not eligible to appear for the examination. They shall re-do the semester(s) after completion of the programme.

8. Examination:

Candidate must complete course duration to appear for the university examination. Examination will be conducted with concurrence of Controller of Examinations as per the Alagappa University regulations. **University may send the representatives as the observer during examinations.** University Examination will be held at the end of the each semester for duration of 3 hours for each subject. Certificate will be issued as per the AU regulations. **Hall ticket will be issued to the 1st year candidates and upon submission of the list of enrolled students along with the prescribed course fee, subsequent 2nd year hall tickets will be issued.**

9. Miscellaneous

a. Each student posses the prescribed text books for the subject and the workshop tools as required for theory and practical classes.
b. Each student is issued with an identity card by the University to identify his / her admission to the course
c. Students are provided library and internet facilities for development of their studies.
d. Students are to maintain the record of practicals conducted in the respective laboratory in a separate Practical Record Book and the same will have to be presented for review by the University examiner.
e. Students who successful complete the course within the stipulated period will be awarded the degree by the University.

10. Fee structure

Course fee shall be as prescribed by the University and 50% of the course fee should be disbursed to University. Special fees and other fees shall be as prescribed by the

Institution and the fees structure must intimated to the University. Course fees should be only by Demand draft / NEFT and AU has right to revise the fees accordingly.

Pattern	Course Fee payment deadline
Semester	Fee must be paid before 10th September of the academic year

11. Other Regulations:

Besides the above, the common regulation of the University shall also be applicable to this programme.

Course Structure

S. No	Study Components	Int.	Ext.	Marks	No. of Subjects	Total
1.	Core course	25	75	100	15	1500
2.	Elective Course	25	75	100	3	300
3.	Non – Major Elective Course	25	75	100	2	200
4.	Project	25	75	100	1	200
	TOTAL	-	-	-	28	2200

M.Sc Industrial Safety & Hygiene

S.No	Course Code	Title of the paper		T/P	Credits	Hours/ Week	Marks		
I Semester							**I**	**E**	**Total**
1	70111	Core 1	Fire Design & Installations	T	5	5	25	75	100
2	70112	Core 2	Safety Equipments and PPE	T	5	5	25	75	100
3	70113	Core 3	Electrical and Chemical Safety	T	4	4	25	75	100
4	70114	Core 4	Safety Concepts	T	4	4	25	75	100
6	70115	Core 5	Lab-I: ERP Practical (Emergency Response Practical)	P	4	8	25	75	100
7	70116A 70116B 70116C	DSE-1	I) Environmental Safety II) Work Study and Ergonomics III) Dock Safety	T	3	3	25	75	100
		Library/ Yoga/Counselling/Fieldtrip				1			
					25	**30**	**150**	**450**	**600**
II Semester									
8	70121	Core 6	Construction Safety	T	4	4	25	75	100
9	70122	Core 7	EHS Laws and Acts	T	4	4	25	75	100
10	70123	Core 8	Industrial Hygiene I : Hazard Identification and Assessment	T	4	4	25	75	100
11	70124	Core 9	Hazardous Waste Management	T	4	4	25	75	100
12	70125	Core 10	Lab-II: Work at Height Practical	P	4	8	25	75	100
13	70126A 70126B 70126C	DSE-2	I) Textile Safety II) Safety In Mines III) Transport Safety	T	3	3	25	75	100
14	70127	Non-Major Elective – House Keeping Management		T	2	3	25	75	100
15		Self-learning course (SLC) –MOOCs			Extra credit				
					25	**30**	**175**	**525**	**700**
III Semester									
16	70131	Core 11	Industrial Hygiene II : Evaluation and Control of Hazards	T	4	4	25	75	100
17	70132	Core 12	Hazard and Risk Analysis	T	4	4	25	75	100
18	70133	Core 13	Safety Audit and Inspection	T	4	4	25	75	100
19	70134	Core 14	Safety at Oil, Gas and Nuclear Sector	T	4	4	25	75	100
20	70135	Core 15	Lab-III: Confined Space and Rescue Operation Practical	P	4	8	25	75	100
21	70136A 70136B 70136C	DSE-3	I) Safety Management Systems II) Safety in Fire Works III) APELL	T	3	3	25	75	100
22	70137	Non-Major Elective- Food Hygiene and Sanitation (HACCP)		T	2	3	25	75	100
23		Self-learning course (SLC) –MOOCs			Extra credit				
					25	**30**	**175**	**525**	**700**
IV Semester									
24	70141	Core 16	***Dissertation Work or Internship Programme	D/I	15	30	50	150	200
Total					**15**	**30**	**50**	**150**	**200**
					90+EC	**120**	**550**	**1650**	**2200**

*DSE–Student Choice and it may be conducted by parallel sections.

**SLC-Voluntary basis

*** Dissertation / internship report –Marks -Vivo-voce(50)+ thesis(100) + internal(50)=200

T-Theory 1cr = 1 hr. /week or 15 hours.

In each theory class, a new concept is taught and the student is learning something new throughout the class.It also involves self-learning.

P-Practical 1cr = 2 hrs. /week or 30 hours. The practical is dependent on theory and experiments performed are based on concepts learned in theory class. Repetition of an already learned concept.Observations are taken again and again.

Experientiallearningincludingrelevantexperienceandprofessionallevelsacquired1Credit=3hrs. /weekor40-45 hours

Minimum credit = 90

M.SC (IS&H) I-Semester					
Core	**Course code: 70111**	**Fire Design and Installations**	**T**	**Credits: 5**	**Hours: 5**
Pre-requisite	**Basic Knowledge of Fire design and Installations**		**Syllabus Revised**		**2023-2024**
Course Objectives	1. To provide an in depth knowledge about the science of fire. 2. To understand the causes and effects of fire. 3. To know the various fire prevention systems and protective equipments. 4. To understand the science of explosion and its prevention techniques. 5. To understand the various fire prevention techniques to be followed in a building.				
UNIT-I	**FUNDAMENTALS OF FIRE SAFETY** Introduction-physical and chemicals properties of fire- mode of heat transfer-flash point-n fire point-AIT(auto ignition temperature- flammable and combustible-fire triangle-fire tetrahedron-explosion pentagon-BLEVE-classification of fire-causes of fire-extinguishing methods-fire extinguisher- fire load calculation-hazardous area classification- fire safety in public place, high rise building, educational institution, shopping malls, chemical labs, warehouse and garages .				
UNIT-II	**SELECTION ,INSTALLATION& MAINTENANCE OF FIRE EXTINGUISHER** Terminology-classification of hazards-number &size of fire extinguisher-fire extinguisher size and placement-selection of location-initial inspection-installation-selection of fire extinguisher-suitability of fire extinguisher-inspection and maintenance-testing of fire extinguisher-maintenance record-rejected extinguisher-refilling-spares-maintenance- checklist				
UNIT-III	**SELECTION ,INSTALLATION AND MAINTENANCE OF FIRE DETECTION & ALARM SYSTEM** Terminology-general requirements-detection zone-automatics fire detectors-heat detector-smoke detectors-optical smoke detectors-air sampling detectors- UV flame detectors-IR flame detectors-sitting of manual call points-inspection &maintenance-test-system disconnecting during testing-spares, checklist				
UNIT-IV	**INSTALLATION & MAINTENANCE OF INTERNAL AND EXTERNAL FIRE HYDRANTS** Terminology-hydrant installation-underground static water tank-terrace tanks-fire pumps & pump house-risers-fire service inlet-typical fire fighting installations/requirements-size of mains-hose reels-water supplies & pumping arrangements-testing-maintenance-check list				
UNIT-V	**FIRE EXIT AND SPECIAL HAZARDS** Introduction-exit requirements-types of exits-occupant load-capacity of exit-arrangements of exits-travel distance-number of exits-fire escape & staircase – flammable and combustible liquids-upper and lower explosive limits-handling and storage of flammable & combustible liquids-hot work activities- hazards and precaution steps.				

References:

NFPA Fire protection Handbook – 21st edition – NFPA - 2023

Principles of fire safety engineering – 2nd edition – Das Akhil kumar – PHL learning Pvt.Ltd – 2020.

Fire Officer – principles and practice – Michael J.Ward – NFPA – 2020.

Head, Eye, and Face Personal Protective Equipment New Trends, Practice and Applications - Katarzyna Majchrzycka - CRC Press – 2023.

Personal Protective Equipment – OSHA – 2023.	
Related online content (MOOC, Swayam,NPTEL, Website etc.)	
https://archive.nptel.ac.in/courses/105/102/105102176/	
https://onlinecourses.nptel.ac.in/noc20_ce09/preview	

Course outcomes		**Knowledge level**
CO-1	To Recall about basic concepts of fire and explosion science.	K1
CO-2	To Practice the operation of various types of fire extinguishers	K3
CO-3	To Summarise the different source of ignition and their prevention techniques	K3
CO-4	To Explain the students to effectively employ explosion protection techniques and their significances to suit the industrial requirement	K2
CO-5	To Interpret the emergency evacuation methods	K5

On what level it correlated with COs & POs -based on that we have to give marks

Mapping Course Outcome Vs Programme Outcomes

Strong (3), M-Medium (2), L- Low (1)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	M(2)	L(1)	M(2)	M(2)	L(1)	L(1)	L(1)	L(1)	M(2)
CO2	M(2)	S(3)	M(2)	M(2)	S(3)	L(1)	M(2)	L(1)	L(1)	S(3)
CO3	L(1)	L(1)	L(1)	M(2)	M(2)	L(1)	L(1)	L(1)	M(2)	S(3)
CO4	M(2)	S(3)	M(2)	M(2)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)
CO5	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)	L(1)	M(2)	M(2)	S(3)
W.AV	**2**	**2.2**	**1.6**	**2**	**2.2**	**1.4**	**1.4**	**1.4**	**1.6**	**2.6**

Mapping Course Outcome Vs Programme Specific outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M(2)	M(2)	L(1)	M(2)	M(2)
CO2	M(2)	S(3)	M(2)	M(2)	M(2)
CO3	M(2)	M(2)	L(1)	M(2)	M(2)
CO4	M(2)	L(1)	M(2)	M(2)	M(2)
CO5	L(1)	M(2)	L(1)	M(2)	S(3)
W.AV	**1.8**	**2**	**1.4**	**2**	**2.2**

S –Strong (3), M-Medium (2), L- Low (1)

M.SC (IS&H) I -Semester					
Core	**Course code: 70112**	**Safety equipments and PPE**	**T**	**Credits: 5**	**Hours: 5**
Pre-requisite	**Basic Knowledge of Safety equipment and PPE**		**Syllabus Revised**		**2023-2024**
Course Objectives	1. To describe basic information and the importance of PPE 2. To differentiate respiratory and non-respiratory PPE's 3. To Identify suitable PPE's for Workplace Hazards 4. To Explain what factors should be considered when select and implementing PPE's 5. To Interpret the International standards of PPE				
Unit - I	**HEAD PROTECTION, EYE PROTECTION& EAR PROTECTION** Introduction of PPE, types ,head protection important-safety helmet types, characteristics- protects against-construction of safety helmet, parts-care and maintenance of safety helmets. **Eye protection**: introduction ,potential hazards of eye-eye protectors –types, characteristics ,protect against-care and maintenance-safety shower and eye wash station-recommended average level of illumination. **Ear protection**: introduction ,hearing mechanism ,hearing loss-permissible exposure level –noise, noise workplace hazards-ear plug advantages and dis-advantages, ear muff advantages and dis-advantages.				
Unit - II	**HAND PROTECTION AND LEG PROTECTION** Hand protection: introduction, injuries, hazards-emergency measure-prevention of hand injuries-type of hand protection-selection –protect against-use and care. Leg protection: introduction- hazards-direct and indirect hazards-protective measure-leggings and leg guards- feet protection checklist-safety shoe-maintenance and care.				
Unit - III	**SKIN PROTECTION** Introduction-causes-physical hazards-chemical substance-plant products-living agents-preventive measure –skin and body protection-protective creams-housekeeping-machine guards-ventilation-storage and transport – identification labels-signboards and barricades				
Unit - IV	**RESPIRATORY PROTECTION** Introduction –types of respiratory PPE- hazards-oxygen deficiency-harmful contaminants- smoke and fumes-gas and vapors-respirators-color code of canister-air purifying respirator-fresh air breathing apparatus-self-contained breathing apparatus –selection-use and fit				
Unit - V	**STANDARDS FOR PPE AND FALL PROTECTION SYSTEM** Introduction of personal protective equipment-applicable statutes-national standards-management responsibilities-work at height –full body harness-fall arrester –active and passive fall protection-ladder, scaffolding, types and parts, requirements of inspection, safety net ,warning signs and color codes.				
References: - Head, Eye, and Face Personal Protective Equipment New Trends, Practice and Applications - Katarzyna Majchrzycka - CRC Press – 2023. Personal Protective Equipment – OSHA – 2023.					

Related online content (MOOC, Swayam,NPTEL, Website etc.)		
https://archive.nptel.ac.in/courses/103/106/103106071/		
https://archive.nptel.ac.in/courses/105/102/105102206/		
Course outcomes		**Knowledge level**
CO-1	To Define personal protective equipment and its importantance	K1
CO-2	To explain the non-respirator PPE uses , care and maintenance	K2
CO-3	To interpret importance of housekeeping and safe handling of hazardous materials	K4
CO-4	To Describe respirator personal protective equipments important in workplace	K1
CO-5	To elaborate international standards and fall protections	K6

On what level it correlated with COs & POs -based on that we have to give marks
Mapping Course Outcome Vs Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	2	1	2	2	2	2	2
CO2	3	2	3	2	1	3	3	2	3	2
CO3	3	3	2	1	1	2	2	2	3	3
CO4	2	2	3	1	1	3	1	2	2	2
CO5	1	2	2	3	3	3	3	2	2	2
W.AV	2.4	2.4	2.6	1.8	1.4	2.6	2.2	2	2.4	2.2

S –Strong (3), M-Medium (2), L- Low (1)

Mapping Course Outcome Vs Programme Specific outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	2	2
CO2	3	2	1	3	3
CO3	2	1	1	2	2
CO4	3	1	1	3	1
CO5	2	3	3	3	3
W.AV	2.6	1.8	1.4	2.6	2.2

S –Strong (3), M-Medium (2), L- Low (1)

MSc in(IS&H) – I Semester					
CORE	**Course code: 70113**	**Electrical and Chemical safety**	**T**	**Credits: 4**	**Hours:4**
Pre-requisite	**Basic Knowledge of Electrical and Chemical safety**		**Syllabus Revised**		**2023-2024**
Course Objectives	1. Tofamiliarize the basic information about electricity and hazards. 2. To educate on electrical hazard analysis. 3. To learn about protection from electrical hazards. 4. To provide technical knowledge in chemical exposure and safety. 5. Toanalyze the handling and storage of hazardous chemicals.				
Unit - I	**Basics of Electricity & Hazards of Electricity** Introduction-Current-Voltage-Power-Resistance-Capacitor-Inductor - Ohm's Law - Types of Electrical Faults-Overloads -Short Circuits-Hazard Analysis-Shock-Arc-Blast - Body Parts & Effects of Shock- Heart, Pulmonary System - Indian Electricity Rules - Statutory Requirements from Electrical Inspectorate-International Standards on Electrical Safety-CPR.				
Unit - II	**Electrical Hazard Analysis** Primary & Secondary Hazards - Shocks - Burns-Scalds Falls - Safety in the Use of Electricity Energy Leakage - Clearances & Insulation - Classes of Insulation - Voltage Classifications - Excess Energy - Current Surges - Over Current & Short Circuit Current- Heating Effects of Current - Electromagnetic Forces - Corona Effect - Static Electricity Sources - Electrical Causes of Fire & Explosion ionization - Spark & Arc - National Electrical Safety Code- Lightning Hazards -Lightning Arrestor -Earthing				
Unit - III	**Minimizing Electrical Hazards** Fuses -Circuit Breakers & Overload Relays - Protection Against Over Voltage & Under Voltage-Safe Limits of Amperage -Safe Distance from Lines - Short Circuit Protection- No Load Protection - Earth Fault Protection - Earthing Standards-Grounding - Equipment Grounding - Miniature Circuit Breaker - Earth Leakage Circuit Breaker - Ground Fault Circuit Interrupter - Electrical Guarding - Personal Protective Equipment's.				
Unit - IV	**Evaluating Hazards & Assessing Risks of Chemicals** Introduction- Types of Chemicals - Routes of Entry Sources of Information-Toxicity-Flammable, Reactive & Explosive Hazards Physical Hazards Nano materials Biohazards- Radioactive Hazards - Labeling of Chemicals - Safety Data Sheet-Globally Harmonized System - Exposure Limits WHMIS Symbols -CLP Hazard Pictogram Toxicological Properties: LC50 & LD50 Flammable Limits - Atmospheric Monitoring-Health Surveillance.				
Unit - V	**Classification &Management of Hazardous Chemicals** Classification of Hazardous Chemicals Green Chemistry Acquisition of Chemicals - Inventory & Tracking of Chemicals - Transportation of Hazardous Chemicals - Emergency Information Panel HAZCHEM Code - Personal Protective Equipment for Chemicals - Chemical Exposure Risk Assessment-Hierarchy of Risk Controls-General Guidelines for Safe Storage & Handling - Chemical Storage Tanks Design Considerations.				

References: -

National Electrical Safety Code (NESC) 2023 Handbook - David J. Marne, John A. Palmer – Mc Graw Hill`s – 2023.
Central Electricity Regulatory Commission Rules And Regulations (Paperback, universal law publication) – 2023.
Creating and Maintaining an Electrical Safety Structure: Duties of Management and Chief Responsible Electrical Specialists - Matthias Surovcik – 2022.
Electric Safety: Practice And Standards - Nor Zaihar Yahaya, Excelic Press – 2019.
Safety And Hazards Management In Chemical Industries – Prof. M.N. Vyas - Atlantic Publishers & Distributors Pvt Ltd – 2022.
Hazardous Chemicals : Safety Management And Global Regulations – T.S.S. Dikshith – 2019.

Related online content (MOOC, Swayam, NPTEL, Website etc.)

https://onlinecourses.swayam2.ac.in/nou20_cs08/preview

https://alison.com/course/chemical-safety-process-safety-managment

Course outcomes		**Knowledge level**
CO-1	To illustrate the fundamental concepts of electricity and risks.	K2
CO-2	To generate the knowledge about analysis of electrical hazards.	K4
CO-3	To Discuss about electrical protection devices.	K4
CO-4	To evaluate the hazards and risks of chemicals.	K5
CO-5	To develop the safe storage and transportation of chemicals.	K6

On what level it correlated with COs & POs -based on that we have to give marks

Mapping Course Outcome Vs Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	2	2	2	2	3	3	2	1	2
CO2	3	3	2	3	2	2	2	2	1	2
CO3	2	2	2	3	2	3	3	2	1	3
CO4	3	1	2	2	2	2	1	1	2	2
CO5	3	3	2	2	2	2	1	1	2	2
W.AV	2.6	2.2	2	2.4	2	2.4	2	1.6	1.4	2.2

S –Strong (3), M-Medium (2), L- Low (1)

Mapping Course Outcome Vs Programme Specific outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	2	1
CO2	3	2	3	2	1
CO3	3	3	2	1	1
CO4	2	2	3	1	1
CO5	1	2	2	3	3
W.AV	2.4	2.4	2.6	1.8	1.4

S –Strong (3), M-Medium (2), L- Low (1)

M.Sc (IS& H) I -Semester					
CORE	**Course code: 70114**	**Safety Concepts**	**T**	**Credits: 4**	**Hours: 4**
Pre-requisite	**Basic Knowledge of Safety Concepts**		**Syllabus Revised**		**2023-2024**
Course Objectives	1. Tofamiliarize the basic information about safety concepts. 2.To provide technical knowledge in safety audit. 3.To educate on accident investigation and reporting. 4.To analyze the calculation of work injury rates. 5.To learn about safety education and training.				
Unit - I	**Concepts&Techniques** History of Safety Movement – Evolution of Modern Safety Concept – GeneralConcepts of Management – Planning for Safety for Optimization of Productivity –Productivity, Quality & Safety – Supervisors & Managers Roles in Safety – SafetyBudgeting – Safety Policy – Incident Recall Technique – Disaster Control – JobSafetyAnalysis–SafetySurvey–SafetyInspection–SafetySampling–Evaluation of Performance onSafety.				
Unit - II	**SafetyAudit** Components of Safety Audit–Types ofAudit–Audit Methodology –Non-ConformityReporting–AuditChecklist&Report–ReviewofInspection–Remarks by Government Agencies, Consultants & Experts– Perusal of Accident& Safety Records & Formats – Implementation of Audit Indication – Liaison with Departments –Identification of UnsafeActs &Unsafe Conditions.				
Unit - III	**Accident Investigation &Reporting** Concept of Accident – Reportable &Non-Reportable Accidents – Reporting to Statutory Authorities – Principles of Accident Prevention – Accident Investigation&Analysis–RecordsforAccidents–DepartmentalAccidentReports–Documentation of Accidents – Domino Sequence – Role of Safety Committee –Cost of Accident.				
Unit - IV	**Safety Performance &Monitoring** ANSI (Z16.1) Recommended Practices for Compiling & Measuring Work InjuryExperience–PermanentTotalDisabilities–PermanentPartialDisabilities–Temporary Total Disabilities – Calculation of Accident Indices – Frequency Rate –Severity Rate – Frequency Severity Incidence –IncidentRate–Safe“T”Score.				
Unit - V	**Safety Education &Training** Importance of Training–Identification of Training Needs–TrainingMethods–Programme,Seminars,Conferences,Competitions–MethodofPromotingSafety–Motivation–Communication– Role of Government Agencies& Private Consulting Agencies in Safety Training–Creating Awareness, Awards, Celebrations – safety Posters, Safety Displays, Safety Pledge – Safety Incentive Scheme – Safety Campaign.				

References

1. HeinrichH.W.“IndustrialAccidentPrevention”McGraw-HillCompany,NewYork,1980.
2. KrishnanN.V.“SafetyManagementinIndustry”JaicoPublishingHouse,Bombay,1997.
3. Lees, F.P., “Loss Prevention in Process Industries” Butterworth publications,London,2ndedition,1990.
4. JohnRidley, “SafetyatWork”,ButterworthandCo.,London,1983.

5. Dan Petersen, "Techniques of Safety Management", McGraw-HillCompany,Tokyo,1981.
6. RelevantIndiaActsandRules,GovernmentofIndia.
7. RelevantIndianStandardsandSpecifications,BIS,NewDelhi.
8. BlakeR.B.,"IndustrialSafety"PrenticeHall,Inc.,NewJersey,1973.
9. "Safetyand Good HouseKeeping",N.P.C.,NewDelhi,1985.
10. "AccidentPreventionManualforIndustrialOperations",N.S.C.Chicago,1982.

Related online content (MOOC, Swayam,NPTEL, Website etc.)

https://archive.nptel.ac.in/courses/110/105/110105094

Course outcomes		**Knowledge level**
CO-1	Understand the fundamental concepts of safety.	K2
CO-2	Identify the safety audit methodology.	K3
CO-3	Generate the accident reporting and investigation procedure.	K4
CO-4	Measure the incident and accident rates.	K5
CO-5	Discuss safety training and methods of safety training .	K5

On what level it correlated with COs & POs -based on that we have to give marks

Mapping Course Outcome Vs Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	1	3	3	2	1	3
CO2	3	3	2	1	2	3	1	2	3	1
CO3	2	1	3	1	2	1	1	1	2	1
CO4	3	2	2	1	1	2	1	1	2	1
CO5	1	3	3	3	2	3	3	2	2	3
W.AV	2.4	2.4	2.6	1.8	1.6	2.4	1.8	1.6	2	1.8

S –Strong (3), M-Medium (2), L- Low (1)

Mapping Course Outcome Vs Programme Specific outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	1	3
CO2	3	2	1	2	3
CO3	1	3	1	2	1
CO4	2	2	1	1	2
CO5	3	3	3	2	3
W.AV	2.4	2.6	1.8	1.6	2.4

S –Strong (3), M-Medium (2), L- Low (1)

M. Sc (IS & H) I -Semester					
LAB	**Course code: 70115**	**EMERGENCY RESPONSE PRACTICAL**	**P**	**Credits: 4**	**Hours: 8**

OBJECTIVES

1.To Impart the Fire Fighting & Emergency response to the students
2.To Express the Evacuating procedure and emergency response procedures

EXPERIMENTS

1. Identification of classes of fire.
2. Learning the methods of fire fighting.
3. Identification of appropriate fire extinguishers.
4. Evacuating workforce by means of emergency siren/alarm.
5. Steps for emergency planning and preparedness.
6. Emergency response team and their response.
7. Headcount procedures.
8. Fire mock drill & rescue operation.
9. Different types of sirens and siren coding.
10.Debriefing and resuming operations.

REQUIREMENTS

1.All type of Fire extinguishers
2.Emergency Services
3.Suitable water and sand buckets
4.All other required safety equipments for fire demo
5.Provision of Windsock

OUTCOMES

The students will be able to
1.To Identify the Fire classifications and fire fighting methods.
2.To Practice Fire Rescue and evacuation methods with ERP procedures
3.To Operate fire mock drill with Headcount arrangements
4.To classify Siren codings and simplify resuming operations.

REFERENCE

1.Guide book on Fire safety – National Safety Council-2014
2.Guide book-Designing for Fire safety-National safety council-2015
3.Practical Guide on SHE-Volume 4-National safety council-2010

<table>
<tr><th colspan="6">M. Sc (IS & H) I -Semester</th></tr>
<tr><td>Elective</td><td>Course code: 70116A</td><td colspan="2">Environmental Safety</td><td>T</td><td>Credits: 3</td><td>Hours: 3</td></tr>
<tr><td>Pre-requisite</td><td colspan="3">Basic Knowledge of environmental safety</td><td colspan="2">Syllabus Revised</td><td>2023-2024</td></tr>
<tr><td>Course Objectives</td><td colspan="6">1. To provide in depth knowledge in Principles of Environmental safety and its applications invarious fields.
2. To give understanding of air and water pollution and their control.
3. To expose the students to the basis in hazardous waste management.
4. To design emission measurement devices.
5. To design emission measurement devices.</td></tr>
<tr><td>UNIT I</td><td colspan="6">AIR POLLUTION
Classification and properties of air pollutants – Pollution sources – Effects of air pollutants on human beings, Animals, Plants and Materials - automobile pollution-hazards of air pollution-concept of clean coal combustion technology - ultra violet radiation, infrared radiation, radiation from sun-hazards due to depletion of ozone - deforestation-ozone holes-automobile exhausts-chemical factory stack emissions-CFC.</td></tr>
<tr><td>UNIT II</td><td colspan="6">WATER POLLUTION
Classification of water pollutants-health hazards-sampling and analysis of water-water treatment - different industrial effluents and their treatment and disposal -advanced wastewater treatment - effluent quality standards and laws- chemical industries, tannery, textile effluents-common treatment.</td></tr>
<tr><td>UNIT III</td><td colspan="6">HAZARDOUS WASTE MANAGEMENT
Hazardous waste management in India-waste identification, characterization and classification- technological options for collection, treatment and disposal of hazardous waste-selection charts for the treatment of different hazardous wastes-methods of collection and disposal of solid wastes-healthhazards-toxic and radioactive wastes-incineration and verification - hazards due to bio-process- dilution-standards and restrictions – recycling and reuse.</td></tr>
<tr><td>UNIT IV</td><td colspan="6">ENVIRONMENTAL MEASUREMENT AND CONTROL
Sampling and analysis – dust monitor – gas analyzer, particle size analyzer – lux meter-pH meter – gas chromatograph – atomic absorption spectrometer.
Gravitational settling chambers-cyclone separators-scrubbers-electrostatic precipitator - bag filter – maintenance - control of gaseous emission by adsorption, absorption and combustion methods- Pollution Control Board-laws.</td></tr>
<tr><td>UNIT V</td><td colspan="6">POLLUTION CONTROL IN PROCESS INDUSTRIES
Pollution control in process industries - cement, paper, petroleum-petroleum products-textile- tanneries-thermal power plants – dying and pigment industries - eco-friendly energy.</td></tr>
<tr><td colspan="7">References
1. E. C Wolfe, Race to Save to Save Planet, Wadsworth Publishing Co., Belmont, CA 2006.
2. G. T Miller, Environmental Science: Working with the Earth, 11th Edition, Wadsworth PublishingCo., Belmont, CA, 2006
3. M.J Hammer,., and M.J Hammer,., Jr., Water and Wastewater Technology, Pearson PrenticeHall, 2006
4. Rao, CS, “Environmental pollution engineering:, Wiley Eastern Limited, New</td></tr>
</table>

Delhi, 1st January2018.

5. S. P. Mahajan, "Pollution control in process industries", Tata McGraw Hill Publishing Company,New Delhi, 2006.

Varma and Braner, "Air pollution equipment", Springer Publishers, Second Edition

Related online content (MOOC, Swayam,NPTEL, Website etc.)

https://nptel.ac.in/courses/112106177

https://www.nfpa.org/Public-Education/Fire-causes-and-risks/Seasonal-fire-causes/Firework

Course outcomes		**Knowledge level**
CO-1	To find the basic concepts of environment.	K1
CO-2	To identify knowledge about renewable and non-renewable energy resources.	K3
CO-3	To Discuss about eco systems and bio diversity.	K4
CO-4	To explain the importance of avoid the environmental pollution.	K5
CO-5	To elaborate the importance of environment related field work	K6

On what level it correlated with COs & POs -based on that we have to give marks

Mapping Course Outcome Vs Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	2	3	3	3	2	3	1	1
CO2	3	1	2	3	3	2	2	3	3	2
CO3	1	1	1	2	1	3	1	2	2	2
CO4	2	1	1	3	2	2	1	3	2	1
CO5	3	3	2	1	3	3	2	1	2	2
W.AV	2.4	1.8	1.6	2.4	2.4	2.6	1.6	2.4	2	1.6

S –Strong (3), M-Medium (2), L- Low (1)

Mapping Course Outcome Vs Programme Specific outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	2	3
CO2	3	3	2	2	3
CO3	2	3	1	1	2
CO4	2	1	2	3	2
CO5	1	2	3	3	1
W.AV	2.2	2.2	1.8	2.2	2.2

S –Strong (3), M-Medium (2), L- Low (1)

M. Sc (IS & H) I -Semester					
Elective	**Course code: 70116B**	**WORK STUDY & ERGONOMICS**	**T**	**Credits: 3**	**Hours: 3**
Pre-requisite	**Basic Knowledge Work Study & Ergonomics**		**Syllabus Revised**		**2023-2024**
Course Objectives	1. To study the applications of ergonomic principles and physiology of workers 2. To know the concepts of personal protective equipment and its usages 3. To create the knowledge in process and equipment design in safety aspects 4. To Prioritise Concept modules in Equipment design 5. To Justify Job and personal risk factors				
Unit I	**WORK STUDY** Study of operations – work content – work procedure – breakdown – human factors – safety and method study – methods and movements at the workplace – substitution with latest devices – robotic concepts – applications in hazardous workplaces – productivity, quality and safety (PQS).				
Unit II	**ERGONOMICS** Definition – applications of ergonomic principles in the shop floor – work benches – seating arrangements – layout of electrical panels- switch gears – principles of motion economy – location of controls – display locations – machine foundations – work platforms, fatigue, physical and mental strain – incidents of accident – physiology of workers.				
Unit III	**PERSONAL PROTECTION** Concepts of personal protective equipment – types – selection of PPE – invisible protective barriers – procurement, storage, inspection and testing – quality – standards – ergonomic considerations in personal protective equipment design.				
Unit IV	**PROCESS AND EQUIPMENT DESIGN** Process design – equipment – instrument – selection – concept modules – various machine tools - in- built safety – machine layout-machine guarding-safety devices and methods – selection, inspection, maintenance and safe usage – statutory provisions, operator training and supervision – hazards and prevention.				
Unit V	**MAN MACHINE SYSTEMS** Job and personal risk factors – standards-selection and training-body size and posture-body dimension (static/dynamic) – adjustment range – penalties – guide lines for safe design and postures – evaluation and methods of reducing posture strain. Man-machine interface-controls -types of control-identification and selection-types of displays- compatibility and stereotypes of important operations-fatigue and vigilance-measurement characteristics and strategies for enhanced performance				

References

Head, Eye, and Face Personal Protective Equipment New Trends, Practice and Applications - Katarzyna Majchrzycka - CRC Press – 2023.

Personal Protective Equipment – OSHA – 2023.

Handbook of Human Factors and Ergonomics Gavriel Salvendy, Waldemar Karwowski – Wiley – 2021.

Ergonomics for Improved Productivity Proceedings of HWWE 2017 Volume 2 - Mohammad Muzammil, Abid Ali Khan, Faisal Hasan – Springer – 2021.		
Related online content (MOOC, Swayam,NPTEL, Website etc.)		
https://www.youtube.com/watch?v=KNFZXNWYVno		
Course outcomes		**Knowledge level**
CO-1	To describe work procedure and applications in hazardous	K 1
CO-2	To Illustrate the human factors in design of Personal protective equipment	K2
CO-3	To Explain the risk factors, guide lines for safe design of man machine systems considering human factors	K5
CO-4	To Justify the Guideline for safe design	K5
CO-5	To elaborate the Strategies for enhanced performance in Man Machine systems	K6

On what level it correlated with COs & POs -based on that we have to give marks
Mapping Course Outcome Vs Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2(M)	1(L)	1(L)	2(M)	1(L)	2(M)	2(M)	1(L)	1(L)	1(L)
CO2	2(M)	1(L)	2(M)	1(L)	1(L)	2(M)	1(L)	2(M)	1(L)	2(M)
CO3	1(L)	1(L)	1(L)	2(M)	2(M)	1(L)	2(M)	1(L)	2(M)	1(L)
CO4	2(M)	2(M)	2(M)	1(L)	1(L)	1(L)	1(L)	1(L)	2(M)	2(M)
CO5	2(M)	1(L)	1(L)	2(M)	1(L)	2(M)	1(L)	2(M)	1(L)	1(L)
W.AV	1.8	1.2	1.4	1.6	1.2	1.6	1.4	1.4	1.4	1.4

Strong (3), M-Medium (2), L- Low (1)

Mapping Course Outcome Vs Programme Specific outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2(M)	1(L)	2(M)	1(L)	1(L)
CO2	1(L)	2(M)	1(L)	2(M)	1(L)
CO3	2(M)	2(M)	1(L)	1(L)	1(L)
CO4	1(L)	1(L)	1(L)	2(M)	2(M)
CO5	2(M)	1(L)	2(M)	1(L)	1(L)
W.AV	1.6	1.4	1.4	1.4	1.2

S –Strong (3), M-Medium (2), L- Low (1)

M. Sc (IS & H) -Semester					
Elective	**Course code:70116C**	**Dock Safety**	**T**	**Credits: 3**	**Hours: 3**
Pre-requisite	**Basic Knowledge Dock Safety**		**Syllabus Revised**		**2023-2024**
Course Objectives	1. To understand safety legislation related to dock activities in India. 2. To understand the causes and effects of accidents during dock activities. 3. To know the various material handling equipment and lifting appliances in dock. 4. To know the safe working on board the ship and storage in the yards. 5. To understand the safe operation of crane, portainers, lift trucks and container handlingequipment.				
Unit - I	**HISTORY OF SAFETY LEGISLATION** History of dock safety statues in India-background of present dock safety statues- dock workers (safety, health and welfare) act 1986 and the rules and regulations framed there under, other statues like marking of heavy packages act 1951 and the rules framed there under - manufacture, storage and import of hazardous chemicals. Rules 1989 framed under the environment (protection) act, 1989 – few cases laws to interpret the terms used in the dock safety statues. Responsibility of different agencies for safety, health and welfare involved in dock work – responsibilities of port authorities – dock labour board – owner of ship master, agent of ship – owner of lifting appliances and loose gear etc. – employers of dock workers like stevedores – clearing and forwarding agents – competent persons and dock worker. Forums for promoting safety and health in ports – Safe Committees and Advisory Committees. Their functions, training of dock workers.				
Unit - II	**WORKING ON BOARD THE SHIP** Types of cargo ships – working on board ships – Safety in handling of hatch beams – hatch covers including its marking, Mechanical operated hatch covers of different types and its safety features – safety in chipping and painting operations on board ships – safe means of accesses – safety in storage etc. – illumination of decks and in holds – hazards in working inside the hold of the ship and on decks – safety precautions needed – safety in use of transport equipment - internal combustible engines like fort-lift trucks-pay loaders etc. Working with electricity and electrical management – Storage – types, hazardous cargo.				
Unit - III	**LIFTING APPLIANCES** Different types of lifting appliances – construction, maintenance and use, various methods of rigging of derricks, safety in the use of container handling/lifting appliances like portainers, transtainer, top lift trucks and other containers – testing and examination of lifting appliances – portainers – transtainers – toplift trucks – derricks in different rigging etc. Use and care of synthetic and natural fiber ropes – wire rope chains, different types of slings and loose gears.				
Unit - IV	**TRANSPORT EQUIPMENT** The different types of equipment for transporting containers and safety in their use-safety in the use ofself loading container vehicles, container side lifter, fork lift truck, dock railways, conveyors and cranes.				

	Safe use of special lift trucks inside containers – Testing, examination and inspection of containers – carriage of dangerous goods in containers and maintenance and certification of containers for safe operation Handling of different types of cargo – stacking and unstacking both on board the ship and ashore – loading and unloading of cargo identification of berths/walking for transfer operation of specific chemical from ship to shore and vice versa – restriction of loading and unloading operations.
Unit - V	**EMERGENCY ACTION PLAN AND DOCK WORKERS (SHW) REGULATIONS 1990** Emergency action Plans for fire and explosions - collapse of lifting appliances and buildings, sheds etc., - gas leakages and precautions concerning spillage of dangerous goods etc., - Preparation of on- site emergency plan and safety report. Dock workers (SHW) rules and regulations 1990-related to lifting appliances, Container handling, loading and unloading, handling of hatch coverings and beams, Cargo handling, conveyors, dock railways, forklift.

References

Introduction to Ship Operations and Onboard Safety 1st Edition 2022 Softbound by OLSEN, Routledge – 2022.
Emergency Evacuation Planning for Your Workplace: From Chaos to Life-Saving Solutions - Jim Burtles – 2017.
Handbook of Rigging Lifting, Hoisting, and Scaffolding for Construction and Industrial Operations – Joseph A.Macdonald – TATA Mcgraw Hill – 2009.
Indian Factories act 1948.
Dock worker act 1986.
Environmental protection act 1986. MSIHC 1989.

Related online content (MOOC, Swayam,NPTEL, Website etc.)

https://archive.nptel.ac.in/courses/114/105/114105003/

https://nptel.ac.in/courses/114105003

Course outcomes		**Knowledge level**
CO-1	To Describe various operations carried out in a dock.	K1
CO-2	To Classify the different acts and rules for safe dock operations.	K4
CO-3	To Explain the operations of various types of material handlingequipments.	K5
CO-4	To Prioritise and response at the time of emergency in a dock.	K5
CO-5	To Elaborate the various problems associated with the use of lifting equipments andin the storage yards.	K6

On what level it correlated with COs & POs -based on that we have to give marks
Mapping Course Outcome Vs Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2(M)	1(L)	1(L)	2(M)	1(L)	2(M)	2(M)	1(L)	1(L)	1(L)
CO2	2(M)	1(L)	2(M)	1(L)	1(L)	2(M)	1(L)	2(M)	1(L)	2(M)
CO3	1(L)	1(L)	1(L)	2(M)	2(M)	1(L)	2(M)	1(L)	2(M)	1(L)
CO4	2(M)	2(M)	2(M)	1(L)	1(L)	1(L)	1(L)	1(L)	2(M)	2(M)
CO5	2(M)	1(L)	1(L)	2(M)	1(L)	2(M)	1(L)	2(M)	1(L)	1(L)
W.AV	1.8	1.2	1.4	1.6	1.2	1.6	1.4	1.4	1.4	1.4

S –Strong (3), M-Medium (2), L- Low (1)

Mapping Course Outcome Vs Programme Specific outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2(M)	1(L)	2(M)	1(L)	1(L)
CO2	1(L)	2(M)	1(L)	2(M)	1(L)
CO3	2(M)	2(M)	1(L)	1(L)	1(L)
CO4	1(L)	1(L)	1(L)	2(M)	2(M)
CO5	2(M)	1(L)	2(M)	1(L)	1(L)
W.AV	1.6	1.4	1.4	1.4	1.2

S –Strong (3), M-Medium (2), L- Low (1)

M.Sc (IS& H) II -Semester					
Core	**Course code: 70121**	**Construction safety**	**T**	**Credits:4**	**Hours:4**
Pre-requisite	**Basic Knowledge of Construction safety**		**Syllabus Revised**		**2023-2024**
Course Objectives	1. To know causes of accidents related to construction activities and human factors associated withthese accident 2.To understand the construction regulations and quality assurance in construction 3. To have the knowledge in hazards of construction and their prevention methods 4.To know the working principles of various construction machinery 5. To gain knowledge in health hazards and safety in demolition work				

UNIT I ACCIDENTS CAUSES AND MANAGEMENT SYSTEMS

Problems impeding safety in construction industry- causes of fatal accidents, types and causes of accidents related to various construction activities, human factors associated with these accident – construction regulations, contractual clauses – Pre contract activates, preconstruction meeting - design aids for safe construction – permits to work – quality assurance in construction - compensation– Education and training

UNIT II HAZARDS OF CONSTRUCTION AND PREVENTION

Excavations, basement and wide excavation, trenches, shafts – scaffolding , types, causes of accidents, scaffold inspection checklist – false work – erection of structural frame work, dismantling –tunneling – blasting, pre blast and post blast inspection – confined spaces – working on contaminated sites – work over water - road works – power plant constructions – construction of high rise buildings.

UNIT III WORKING AT HEIGHTS

Fall protection in construction OSHA 3146 – OSHA requirement for working at heights, Safe access and egress – safe use of ladders- Scaffoldings , requirement for safe work platforms, stairways, gangways and ramps – fall prevention and fall protection , safety belts, safety nets, fall arrestors, controlled access zones, safety monitoring systems – working on fragile roofs, work permit systems, height pass – accident case studies.

UNIT IV CONSTRUCTION MACHINERY

Selection, operation, inspection and testing of hoisting cranes, mobile cranes, tower cranes, crane inspection checklist - builder's hoist, winches, chain pulley blocks – use of conveyors – concrete mixers, concrete vibrators – safety in earth moving equipment, excavators, dozers, loaders, dumpers, motor grader, concrete pumps, welding machines, use of portable electrical tools, drills, grinding tools, manual handling scaffolding, hoisting cranes – use of conveyors and mobile cranes – manual handling.

UNIT V SAFETY IN DEMOLITION WORK

Safety in demolition work, manual, mechanical, using explosive - keys to safe demolition, pre survey inspection, method statement, site supervision, safe clearance zone, health hazards from demolition- Indian standard - trusses, girders and beams – first aid – fire hazards and preventing methods –interesting experiences at the construction site against the fire accidents

References 1. Handbook of OSHA Construction safety and health charles D. Reese and James V. Edison 2. Hudson, R.,"Construction hazard and Safety Hand book, Butter Worth's, 1985. 3. Jnathea D.Sime, "Safety in the Build Environment", London, 1988. 4. V.J.Davies and K.Thomasin "Construction Safety Hand Book" Thomas Telford Ltd., London, 1990		
Related online content (MOOC, Swayam,NPTEL, Website etc.)		
https://onlinecourses.nptel.ac.in/noc21_ce16/preview		
https://archive.nptel.ac.in/courses/105/102/105102206/		
Course outcomes		**Knowledge level**
CO-1	To Recall the problems impeding safety in construction industries.	K1
CO-2	To Summarise the types and causes of accidents, and designing aids for safe construction.	K2
CO-3	To Categorise the hazards during construction of power plant, road works and high rise buildings.	K4
CO-4	To Interpret construction regulations and Indian standards for construction and demolition work.	K5
CO-5	To Elaborate the safety procedure for working at heights during construction.	K6

MSc (IS &H) - II Semester					
CORE	**Course code: 70122**	**EHS LAWS AND ACTS**	**T**	**Credits:4**	**Hours:4**
Pre-requisite	**Basic knowledge of EHS Laws & Acts**		**Syllabus Revised**		**2023-2024**
Course Objectives	1.Tofamiliarize the basic information about factories act 1948. 2.To educate on environment act 1986. 3.To learn about manufacture ,storage and import of hazardous chemicals rules 1989. 4.To provide knowledge about important EHS legislations. 5.To learn about international health and safety laws.				

Unit I-Factories Act, 1948

Statutory Authorities - Inspecting Staff, Health, Safety, Provisions Relating to Hazardous Processes, Welfare, Working Hours, Employment of Young Persons - Special Provisions - Penalties and Procedures-Tamil Nadu Factories Rules 1950 Under Safety and Health Chapters of Factories Act 1948.

Unit II-Environment Act, 1986

General Powers of The Central Government, Prevention, Control and Abatement of Environmental Pollution-Biomedical Waste (Management and Handling Rules, 1989-The Noise Pollution (Regulation and Control) Rules, 2000-The Batteries (Management and Handling Rules) 2001- No Objection Certificate from Statutory Authorities Like Pollution Control Board. Air Act 1981 And Water Act 1974: Central and State Boards for The Prevention and Control of Air Pollution-Powers and Functions of Boards - Prevention and Control of Air Pollution and Water Pollution - Fund-Accounts and Audit, Penalties and Procedures.

Unit III-Manufacture. Storage & Import of Hazardous Chemical Rules, 1989

Definitions - Duties of Authorities - Responsibilities of Occupier- Notification of Major Accidents-Information to be Furnished- Preparation of Offsite and Onsite Plans - List of Hazardous and Toxic Chemicals-Safety Reports-Safety Data Sheets.

Unit IV-Other Acts & Rules

Indian Boiler Act 1923, Static And Mobile Pressure Vessel Rules (SMPV), Motor Vehicle Rules, Mines Act 1952, Workman Compensation Act, Rules - Electricity Act And Rules - Hazardous Wastes (Management And Handling) Rules, 1989, With Amendments In 2000- The Building And Other Construction Workers Act 1996, Petroleum Rules, Gas Cylinder Rules-Explosives Act 1983-Pesticides Act.

Unit V-International Acts & Standards

Occupational Safety and Health Act of USA (The William Steiger Act of 1970) - Health And Safety Work Act (HASAWA 1974, UK)-OSHAS 18000-ISO 14000- American National Standards Institute (ANSI).

References. 1. The Factories act, 1948. 2. The Environment act, 1986. 3. Manufacture, storage and import of hazardous chemical rules, 1989. 4. The Indian boiler act 1923, International acts and health and safety standards.		
Related online content (MOOC, Swayam, NPTEL, Website etc.)		
https://onlinecourses.swayam2.ac.in/cec20_ge19/preview		
https://www.classcentral.com/course/swayam-health-safety-management-14339		
Course outcomes		**Knowledge level**
CO-1	To express the basic concepts of factories act 1948.	K2
CO-2	To explain the knowledge about environment act 1986.	K4
CO-3	To discuss manufacture, storage, import of hazardous chemicals rules 1989.	K4
CO-4	To Explain theimportant industrial safety laws.	K4
CO-5	To Determine the various international health and safety laws and standards.	K5

M.Sc (IS&H) II -Semester					
Core	**Course code: 70123**	**Industrial Hygiene -1- Hazard Identification &Assessment**	**T**	**Credits:4**	**Hours:4**
Pre-requiste	**Basic knowledge of Industrial hygiene**		**Syllabus Revised**		**2023-2024**
Course Objectives	1.To familiarize with Introduction to Industrial Hygiene, Human Physiology and Industrial diseases 2. To Express Hazard Recognition and evaluation 3.To Interpret the fundamentals of toxicology 4. To Discuss the Industrial Ergonomics 5.ToPractice Air Sampling, Biological monitoring and Health surveillance				

UNIT-1 INTRODUCTION TO INDUSTRIAL HYGIENE, HUMAN PHYSIOLOGY & INDUSTRIAL DISEASES

Introduction to Industrial Hygiene-Human Systems

Units of Cells and Cell structure- Structure of the body – Muscles and Bones-Nervous system-Digestive system-Respiratory system-Defense system-Skin & sense organs.

UNIT-2 HAZARD RECOGNITION AND EVALUATION

Industrial Hazard -Evaluation Industrial Noise- Ionizing Radiation-Nonionizing Radiation, Thermal Stress,Ergonomics-Blood bone diseases-Hepatitis B& C, HIV,leptospirosis- Ventilation-Local Exhaust Ventilation, Dilution Ventilation of Industrial Workplaces-Administrative controls-PPE-Determining the control measures.

UNIT-3 FUNDAMENTALS OF TOXICOLOGY

Introduction of toxicology-Classification of Toxic materials in Air: Irritants, Asphyxiants, Anesthetics, Blood damaging agents, Lung Damaging Agents- Metabolism-Excretion-Response to toxin- Stages of Toxicology Evaluation-Exposure limits-ACGIH-Threshold Limit Values-HAZCHEM.

UNIT-4 INDUSTRIAL ERGONOMICS

Introduction-Workplace Risk Assessment-Factors Affecting Performance of physical tasks-Manual Handling-Repetitive Tasks-Display Screen Equipment-Carpal tunnel Syndrome-White finger-MSD-WRLUD-Minimum requirements for Workstations-Design of the job-Design of the workplace- Administrative Controls.

UNIT-5 AIR SAMPLING, BIOLOGICAL MONITORING & HEALTH SURVEILLANCE

Introduction-Sampling Particulates – Sampling Gases & Vapors- Sampling & Analytical Methods-Indoor Air quality-HVAC-Microorganism & AAQ-Urine-Blood-Skin-Breath-Vision-X Rays-Neurological Tests-Audiometry-Lung Function tests: Lung Volume,Airway Resistance-Bilogical Exposure indices(BEI).

References

1. Toxicology Fundamentals, Target organs, and Risk Assessment, 2nd edition, Hemisphere Publishing Corps, 1991Lu, Frank C, Basic,
2. The Basic Science of Poisons Amdur M. Doull, J and Klassen, C.D.
3. Handbook of Occupational Safety & Health Lawrance Slote,
4. U S Department of Labor, Occupational Outlook Handbook
5. Industrial toxicology Philip L. Williams and James L. Burson,
6. Inhalation Toxicology Research Methods, Applications and Evaluationm, Harry Salem
7. Industrial hygiene & Toxicology, Volume –2, Frank a. Petty
8. Environmental Occupational Medicine, Third Edition, William N.Rom

Related online content (MOOC, Swayam,NPTEL, Website etc.)

https://onlinecourses.nptel.ac.in/noc20_de12/preview

https://freevideolectures.com/course/4040/nptel-chemical-process-safety/10

Course outcomes		**Knowledge level**
CO-1	To Describe the basics of Industrial Hygiene, Human physiology and Industrial diseases	K1
CO-2	To Interpret the Hazard recognition and Evaluation	K4
CO-3	To Prioritize the Fundamentals of Toxicology	K5
CO-4	To Assess the Industrial Ergonomics	K5
CO-5	To Elaborate Air sampling, Biological monitoring and health surveillance	K6

M.Sc (IS&H) II -Semester					
Core	**Course code: 70124**	**Hazardous waste Management**	**T**	**Credits:4**	**Hours:4**
Pre-requiste	**Basic knowledge of Hazardous waste management**		**Syllabus Revised**		**2023-2024**
Course Objectives	1.To familiarize students with laws and regulations governing hazardous waste storage, transport and treatment 2. To provide an introduction to different pollution prevention and waste minimization opportunities for hazardous waste 3.To identify environmental concerns for hazardous waste on water, land and air 4. To offer necessary equations and design examples to evaluate the effectiveness of different physicochemical, biological and thermal treatment technologies for hazardous waste 5.To identify containment technologies and land treatment techniques for hazardous waste.				

UNIT I SOURCES, CLASSIFICATION AND REGULATORY FRAMEWORK

Types and Sources of solid and hazardous wastes - Need for solid and hazardous waste management –- Salient features of Indian legislations on management and handling of municipal solid wastes, hazardous wastes, biomedical wastes, nuclear wastes - lead acid batteries, electronic wastes, plastics and fly ash – Elements of integrated waste management and roles of stakeholders - Financing and Public Private Participation for waste management.

UNIT II WASTE CHARACTERIZATION AND SOURCE REDUCTION

Waste generation rates and variation - Composition, physical, chemical and biological properties of solid wastes – Hazardous Characteristics – TCLP tests – waste sampling and characterization plan - Source reduction of wastes –Waste exchange - Extended producer responsibility - Recycling and reuse

UNIT III STORAGE, COLLECTION AND TRANSPORT OF WASTES

Handling and segregation of wastes at source – storage and collection of municipal solid wastes – Analysis of Collection systems - Need for transfer and transport – Transfer stations Optimizing waste allocation– compatibility, storage, labeling and handling of hazardous wastes – hazardous waste manifests and transport

UNIT IV WASTE PROCESSING TECHNOLOGIES

Objectives of waste processing – material separation and processing technologies – biological and chemical conversion technologies – methods and controls of Composting - thermal conversion technologies and energy recovery – incineration – solidification and stabilization of hazardous waste- treatment of biomedical wastes - Health considerations in the context of operation of facilities,handling of materials and impact of outputs on the environment-

UNIT V WASTE DISPOSAL

Waste disposal options – Disposal in landfills - Landfill Classification, types and methods – site selection - design and operation of sanitary landfills, secure landfills and landfill bioreactors – leachate and landfill gas management – landfill closure and environmental monitoring – Rehabilitation of open dumps – landfill remediation

References

1.Hazardous waste management Charles A. Wentz. Second edition 1995. McGraw Hill International.
2.Environmental Sciences by Daniel B. Botkin and Edward A. Keller, Wiley student, 6th edition-2009.
3.Harry M. Freeman, Standard handbook of Hazardous waste treatment and disposal McGraw Hill 1997
4.Hazardous Waste (Management and Transboundary Movement) Rules, Ministry of Environment and Forests, Government of India, New Delhi, 1989

Related online content (MOOC, Swayam,NPTEL, Website etc.)

https://archive.nptel.ac.in/courses/105/106/105106056/

https://archive.nptel.ac.in/content/storage2/courses/105106056/Introduction.pdf

Course outcomes		**Knowledge level**
CO-1	To Describe the sources,classification and regulatory framework in Hazardous waste management	K1
CO-2	To Summarise Waste characterization and source reduction with different methods	K2
CO-3	To Examine the storage, collection and transportation of waste with optimization techniques	K4
CO-4	To Compare Waste Processing technologies handling and impact of outputs on the environment	K5
CO-5	To Elaborate Global Issues and provide solutions with corporate social responsibility	K6

M.SC (IS&H) II -Semester					
Core	**Course code: 70125**	**WORK AT HEIGHT PRACTICAL**	**P**	**Credits:4**	**Hours:8**

OBJECTIVES:

1.To Provide Safety in Work at Height to students
2.To Impart PTW for Work height with illustrations to students.

EXPERIMENTS:

1.100% tied off procedure.

2.3 point anchorage while ascending and descending.

3.Wearing the full body harness with double lanyard.

4.Using method of vertical / horizontal lifeline.

5.Training on the use of fall arrestor – rope grab and retractable.

6.Using the safety net for man falling and material handling.

7.Inspection of all fall protection equipments.

8.Learning of technical data's about fall protectors.

REQUIREMENTS:

1.Fall protection harness with double lanyard.

2.Rope grab.

3.Vertical / horizontal lifeline.

4.Fall arrestor – retractable.

5.Safety net and Debris net.

6.Mobile ladders.

7.All other training and safety required equipments.

OUTCOMES:

The students will be able to
1.To Illustrate tie off procedure and anchorage ascending and descending methods
2.To Interpret the full body harness and method of vertical / horizontal lifeline
3.To Priorities use of fall arrestor and safety net
4.To Justify technical data's on Fall arrestors and Fall protection equipments

M. Sc (IS & H) II -Semester					
Elective	**Course code:70126A**	**Textile Safety**	**T**	**Credits:3**	**Hours:3**
Pre-requisite	**Basic Knowledge of safety in textile industries**		**Syllabus Revised**		**2023-2024**
Course Objectives	1. Toprovidethestudentaboutthebasicknowledgeaboutthetextileindustriesanditsproductsbyusingvariousmachineries. 2. Toenforcetheknowledgeontextileprocessingandvariousprocessesinmakingtheyarnfromcottonorsyntheticfibres. 3. Tounderstandthevarious hazards of processingtextilefibresbyusingvariousactivities. 4. Toinculcate theknowledgeonhealthandwelfareactivitiesspecific totheTextileindustriesaspertheFactoriesAct.				

UNITI INTRODUCTION

Introduction to process flow charts of i) short staple spinning, ii) long staple spinning, iii) viscose rayonandsyntheticfibre,manufacturer,iv)spunandfilamentyarntofabricmanufacture,v)jutespinningandjutefabricmanufacture-accidenthazard,guardingofmachineryandsafetyprecautionsinopening, carding, combing, drawing, flyer frames and ring frames, doubles, rotor spinning, winding,warping,softening/spinning specifictojute.

UNITII TEXTILEHAZARDS I

Accident hazards i)sizing processes- cooking vessels, transports of size, hazards due to steam ii)Loom shed–shuttleloomsandshuttlessloomsiii)knittingmachinesiv) non-wovens.

UNITIII TEXTILEHAZARDS II

Scouring,bleaching,dyeing,punting,mechanicalfinishingoperationsandeffluentsintextileprocesses.

UNITIV HEALTHAND WELFARE

Health hazards in textile industry related to dust, fly and noise generated-control measures-relevantoccupational diseases, personal protective equipment-health and welfare measures specific to textileindustry,Specialprecautionsforspecifichazardous workenvironments.

UNITV SAFETYSTATUS

Relevant provision of factories act and rules and other statues applicable to textile industry – effluenttreatmentandwastedisposalin textileindustry.

References

1. 100Textilefires –analysis,findingsandrecommendationsLPA
2. GrooverandHenryDS,“Handbookoftextiletestingandqualitycontrol”
3. “Qualitytolerancesforwaterfortextileindustry”,BIS
4. Shenai,V.A.“Atechnologyoftextileprocessing”,Vol.I,TextileFibres
5. Little,A.H.,“Watersuppliesandthetreatmentanddisposalofeffluent”

Related online content (MOOC, Swayam,NPTEL, Website etc.)

https://archive.nptel.ac.in/courses/116/102/116102029/

https://archive.nptel.ac.in/content/storage2/courses/103103027/pdf/mod9.pdf

Course outcomes		**Knowledge level**
CO-1	To describe about the textile industries and itsoperations.	K1
CO-2	To Explain thevariousconceptsunderlying intheprocessesinvolvedinprocessingoffibrestoyarn.	K2
CO-3	To Classify various hazards in the textile industry and will be able toapplythe controlmeasures tomitigatetheriskemanatingfromthehazard.	K4
CO-4	To Interpret the various health and welfare activities as pertheFactoriesactandcould implementstatutoryrequirements.	K5
CO-5	To Determine various methods meant formitigatingtheriskandabletoguidehissubordinatesinexecutingthework safely.	K5

M. Sc (IS & H) II -Semester					
Elective	**Course code: 70126B**	**Safety in Mines**	**T**	**Credits:3**	**Hours:3**
Pre-requisite	**Basic Knowledge of safety in mines**		**Syllabus Revised**		**2023-2024**
Course Objectives	1. Toprovideindepthknowledgeon Safetyofmines of varioustypes. 2. Tostudy,knowandunderstandaboutthetypesofminesandvariousrisk involvedin theminingoperations. 3. To get exposed to various types of accidents happened in mines and how to manage duringaccidents. 4. To analyze the nature of mining activities and developing a safety system to reduce the risk andalsotoimplementtheEmergencypreparednessintheworkingenvironment ofmines andtoplanforthedisastermanagement.				

UNITI OPENCASTMINES

Causes and prevention of accident from: Heavy machinery, belt and bucket conveyors, drilling, handtools-pneumatic systems, pumping, water, dust, electrical systems, fire prevention.Garage safety –accidentreportingsystem-workingcondition-safetransportation– handlingofexplosives.

UNITII UNDERGROUND MINES

Fallofroofandsides-effectofgases-fireandexplosions-waterflooding-warningsensors-gasdetectors-occupationalhazards-workingconditions-windingandtransportation.

UNITIII TUNNELLING

Hazards from: ground collapse,inundationandcollapseoftunnel face,falls fromplatforms anddanger from falling bodies. Atmospheric pollution (gases and dusts) – trapping –transport-noise-electrical hazards-noise and vibration from: pneumatic tools and other machines – ventilation andlighting –personalprotective equipment.

UNITIV RISKASSESSMENT

Basicconceptsofrisk-reliabilityandhazardpotential-elementsofriskassessment– statisticalmethods – controlcharts-appraisal of advanced techniques-fault tree analysis-failure mode and effectanalysis–quantitativestructure-activityrelationshipanalysis-fuzzymodelforrisk assessment.

UNITV ACCIDENT ANALYSIS ANDMANAGEMENT

Accidents classification and analysis-fatal, serious, minor and reportable accidents – safety audits-recent development of safety engineering approaches for mines-frequency rates-accident occurrence-investigation-measures for improving safety in mines-cost of accident-emergency preparedness –disastermanagement

References

1. DGMSCirculars-MinistryofLabour,GovernmentofIndiapress,ORLovelyPrakashan-DHANBAD,2002.
2. Kejiriwal,B.K. SafetyinMines,GyanPrakashan,Dhanbad, 2001.
3. "MineHealthandSafetyManagement",MichaelKarmised.,SME,Littleton,Co.2001.

Related online content (MOOC, Swayam,NPTEL, Website etc.)

https://onlinecourses.nptel.ac.in/noc23_mg98/preview		
https://onlinecourses.nptel.ac.in/noc22_mg55/preview		
Course outcomes		**Knowledge level**
CO-1	To Describe basicsof safetyaspects intheminingindustries.	K1
CO-2	To classify the various types of mining activities like open casemines,undergroundminesandtunnel ling.	K4
CO-3	To Simplify the various risks involved in the mining activities and come toknowaboutthevarioussafetyactivities tobetaken toensurethesafetyoftheworkers.	K4
CO-4	To Explain the techniques like risk assessment Disaster management andemergencypreparednesswiththe properknowledgeon accidentprevention.	K5
CO-5	To effectively Elaborate their knowledge on accident prevention inmines.	K6

M. Sc (IS & H) II -Semester					
Elective	**Course code: 70126C**	**TRANSPORT SAFETY**	**T**	**Credits:3**	**Hours:3**
Pre-requisite	**Basic Knowledge Transport safety**		**Syllabus Revised**		**2023-2024**
Course Objectives	1. Toprovidethestudentsaboutthevariousactivities/stepstobefollowedinsafehandlingthehazardousgoodstransportationfromonelocation toanotherlocation. 2. Toeducatethereasonsfortheroadaccidentandtherolesandresponsibilitiesofa safeDriverandthetraining needsofthedriver. 3. Toinculcatethecultureofsafedrivingandfuelconservationalongwithknowingofbasictrafficsymbolsfollowed throughoutthe highways				

UNITI TRANSPORTATION OFHAZARDOUS GOODS

Transport emergency card (TREM) – driver training-parking of tankers on the highways-speed of thevehicle – warning symbols – design of the tanker lorries -static electricity-responsibilities of driver –inspectionandmaintenanceofvehicles-checklist-loadinganddecantingprocedures–communication.

UNITII ROAD TRANSPORT

Introduction–factorsforimprovingsafetyonroads–causesofaccidentsduetodriversandpedestrians-design, selection, operation and maintenance of motor trucks-preventive maintenance-checklists-motorvehiclesact –motorvehicle insurance andsurveys.

UNITIII DRIVERAND SAFETY

Driversafetyprogramme–selectionofdrivers–drivertraining-tacho-graph-drivingtest-driver'sresponsibility-accident reporting and investigation procedures-fleet accident frequency-safe drivingincentives-slogans in drivercabin-motor vehicletransport workers act-driverrelaxation and restpauses –speed andfuelconservation–emergencyplanningand Hazmatcodes

UNITIV ROAD SAFETY

Roadalignmentandgradient-reconnaissance-rulinggradient-maximumriseperk.m.-factorsinfluencing alignment like tractive resistance, tractive force, direct alignment, vertical curves-breakingcharacteristics of vehicle-skidding-restriction of speeds-significance of speeds- Pavement conditions –Sightdistance–Safetyatintersections–Trafficcontrollinesandguideposts-guardrailsandbarriers

– streetlightingandilluminationoverloading-concentrationofdriver.

Plantrailway:Clearance-track-warningmethods-loadingandunloading-movingcars-safetypractices.

UNITV SHOPFLOORANDREPAIRSHOPSAFETY 9

Transportprecautions-safetyon manual, mechanicalhandlingequipmentoperations-safe driving-movement of cranes-conveyors etc., servicing and maintenance equipment-grease rack operation-wash rack operation-battery charging-gasoline handling-other safe practices-off the road motorizedequipment.

References

1. "AccidentPreventionManualforIndustrialOperations",NSC, Chicago,1982.
2. Babkov,V.F.,"RoadConditionsandTrafficSafety"MIRPublications,Moscow,1986.
3. K.W.Ogden,"SaferRoads –AguidetoRoadSafetyEngineering"
4. Kadiyali,"TrafficEngineeringandTransportPlanning"KhannaPublishers,NewDelhi,1983.

5. MotorVehiclesAct,1988,GovernmentofIndia.		
Related online content (MOOC, Swayam,NPTEL, Website etc.)		
https://nptel.ac.in/courses/105105215		
https://onlinecourses.nptel.ac.in/noc22_ce41/preview		
Course outcomes		**Knowledge**
CO-1	To Describe the Transportation of Hazardous goods with legal procedures	K1
CO-2	To Explain the road transport safety with preventive maintenance checklists and motor vehicle insurance and surveys	K2
CO-3	To Examine the Driver safety programme with emergency planning and HAZMAT codes	K4
CO-4	To Interpret Road safety with Clearance and pavement conditions	K5
CO-5	To Justify the usage of Transport precautions with safety on manual	K5

M. Sc (IS & H) II -Semester					
Non-Major Elective	**Course code: 70127**	**House Keeping Management**	**T**	**Credits: 2**	**Hours:3**
Pre-requisite	**Basic Knowledge of House Keeping Management**		**Syllabus Revised**		**2023-2024**
Course Objectives	• To know about the importance of housekeeping and employees responsibilities. • To familiarize to the housekeeping equipments and cleaning agents. • To know about housekeeping cleaning methods and its records. • To know about laundry work and its importance. • To know about pest control techniques and how to act in case of emergency.				

Unit – I - Introduction About Housekeeping

Importance Of Housekeeping In The Hospitality Industry - Types Of Lodging Establishments - Organisational Chart – Duties And Responsibilities Of Housekeeping Employees - Necessity Of The Personnel Factor In Dealing With The Guest On A Day To Day Basis.

Unit – II – Housekeeping Equipment And Procedure

Cleaning Equipment – Selection Of Equipment, Brooms And Brushes, Protective Equipment, Cloths Used In Cleaning, Box Sweeper, Electric Equipment, Vacuum Cleaner, Floor Scrubbing And Polishing Machine, Floor Shampooing Machine, Containers Trolley, Chamber Maid's Trolley, Etc. Use And Care Of Equipment And Material Required By The House Keeping Department. Solvents Grease Absorbents, Disinfectants, Antiseptics, Soaps, Deodorants, Detergents, Polishes & Storage. Hazardous Materials.

Unit – III – Cleaning Methods And The Areas

Cleaning Methods – Care, Cleaning And Polishing Of Various Surfaces, Hard Floorings, Thermoplastic Floorings, Wooden, Surfaces Painted, Varnished, Laminated Compositions, Walls And Wall Coverings, Furniture Of Various Types E.G., Brass, Copper, Aluminum, Stainless Steel, Chromium. Cleaning Of Guest Rooms And Bath – Daily, Weekly And Spring Cleaning, Night Service, Check List Of Standard Guest And Bathroom Supplies, Room Occupancy List, Housekeepers Report, Handling Room Transfers, Lost And Found, Cleaning Of Public Restaurant. Food Service, Areas And Employees Areas.

Unit – IV – Laundry Work And Linen Room Cleaning

Laundry Work – Use Of Laundry Agents, Laundry Equipment, Stain Removal Agents, Handling Guest Laundry. Linen Room – Its Importance In Hotels, Selection And Buying Of Linen, Inspecting, Receiving Used Linen. Linen Stock For Any Establishment.

Unit – V – Pest Control House Keeping

Pest Control And Eradication – With Special Reference To Rats, Cockroaches, Furniture Beetle, Clothes Moth, Etc. Dealing With Emergency Situation Like Fire, Death, Theft, Accidents, Safety Security Control.

Reference: -

1. Hotel Housekeeping: Operations And Management 3e (Includes Dvd) Third Edition Mr G. Raghubalan And Ms Smritee Raghubalan.
2. Diploma In Housekeeping Management, The Complete Syllabus - As Per The Ugc (B-Voc) Norms And In Pursuance Of The National Education Policy (Nep) Of The Indian Government (English, Paperback, Dr Anshumali Pandey).

M.SC (IS&H) III -Semester					
Core	**Course code: 70131**	**Industrial Hygiene II-Evaluation and Control of Hazards**	**T**	**Credits:4**	**Hours:4**
Pre-requisite	**Basic knowledge of Industrial hygiene**		**Syllabus Revised**		**2023-2024**
Course Objectives	1.To familiarize with Introduction to Industrial Safety and Hygiene 2. To appraise monitoring of safety, health and environment with standards and control methods 3.To Prioritize Occupational Health and Environmental Safety education with evaluation and training programmes. 4. To Interpret Occupational Safety, Health and environmental management with its functions and needs 5.To Solve industrial Hazards with necessary Control methods and Precautional measures.				

UNIT I

INTRODUCTION

Occupational Health and Environmental Safety Management - Principles practices. Common Occupational diseases: Occupational Health Management Services at the work place. Pre- employment, periodic medical examination of workers, medical surveillance for control of occupational diseases and health records.

UNIT II

MONITORING FOR SAFETY, HEALTH & ENVIRONMENT

Occupational Health and Environment Safety Management System, ILO and EPA Standards Industrial Hygiene: Definition of Industrial Hygiene, Industrial Hygiene: Control Methods, Substitution, Changing the process, Local Exhaust Ventilation, Isolation, Wet method, Personal hygiene, housekeeping and maintenance, waste disposal, special control measures.

UNIT III

OCCUPATIONAL HEALTH AND ENVIRONMENTAL SAFETY EDUCATION

Element of training cycle, Assessment of needs.Techniques of training, design and development of training programs.Training methods and strategies types of training.Evaluation and review of training programs. Occupational Health Hazards, Promoting Safety, Safety and Health training, Stress and Safety, Exposure Limit .

UNIT IV

OCCUPATIONAL SAFETY, HEALTH AND ENVIRONMENT MANAGEMENT

Bureau of Indian standards on safety and health 14489 - 1998 and 15001 – 2000, OSHA, Process Safety Management (PSM) as per OSHA, PSM principles, OHSAS – 18001, EPA Standards, Performance measurements to determine effectiveness of PSM. Importance of Industrial safety, role of safety department,

UNIT V

INDUSTRIAL HAZARDS

i. Radiation: Types and effects of radiation on human body, Measurement and detection of radiation intensity. Effects of radiation on human body, Measurement – disposal of radioactive waste, Control of

radiation ii. Noise and Vibration: Sources, and its control, Effects of noise on the auditory system and health, Measurement of noise , Different air pollutants in industries, Effect of different gases and particulate matter ,acid fumes ,smoke, fog on human health, Vibration: effects

References

1. Jeanne MagerStellman, Encyclopedia of Occupational Health and Safety (ILO) Ms. Irma Jourdan publication
2. Frank P Lees - Loss of prevention in Process Industries, Vol. 1 and 2,
3. ButterworthHeinemann Ltd., London (1991). 2. Industrial Safety - National Safety Council of India
4. Frank P Lees – Loss of prevention in Process Industries , Vol. 1 and 2, Butterworth- Heinemann Ltd., London
5. R. K. Jain and Sunil S. Rao, Industrial Safety , Health and Environment Management Systems, Khanna publishers, New Delhi (2006).

Related online content (MOOC, Swayam,NPTEL, Website etc.)

https://onlinecourses.nptel.ac.in/noc20_mg43/preview

https://archive.nptel.ac.in/courses/110/105/110105094/

Course outcomes		**Knowledge level**
CO-1	To Describe the basics of Industrial Hygiene	K1
CO-2	To Outline the monitoring of Safety, Health and Environment	K2
CO-3	To Priorities the occupational health and environmental safety education	K5
CO-4	To Justify occupational safety,health and environmental manageement	K5
CO-5	To Elaborate Industrial Hazards	K6

M.SC (IS&H) III -Semester					
Core	**Course code: 70132**	**Hazard and Risk Analysis**	**T**	**Credits:4**	**Hours:4**
Pre-requisite	**Basic Knowldege of Hazard and Risk Analysis**		**Syllabus Revised**		**2023-2024**
Course Objectives	1.To Describe fundamentals of Hazard and risk with Human error analysis 2.To Express Risk analysis with Root cause analysis methods and Cost benefit analysis 3.To Evaluate HAZOP studies with its methodologies 4.To Prioritise Hazard Identification & Risk Assessment with Qualitative and Quantitative site assessment 5.To Develop credibility of risk assessment techniques through Past accident analysis				

UNIT I FUNDAMENTALS OF HAZARD, RISK

Introduction- hazard & Risk-Risk register-Checklist-hazard characterization-horseplay-hazardous event- unsafe act-unsafe condition preliminary hazard analysis-ALARP- Concept of ALARP and its application in Risk Assessment -Safety Warning System-Human error analysis.

UNIT II RISK ANALYSIS METHODS

Risk analysis-What Is Risk Identification-*What Is Risk Analysis-benefits of risk analysis-risk analysis process*-Root Cause Analysis.Job safety analysis-Risk-Benefit and Cost-Benefit Analysis.

UNIT III SAFETY MANAGEMENT TOOLS

Hazard and Operability Studies (HAZOP)-HAZOP METHODOLOGY-Hazard analysis (HAZAN)-Fault Tree Analysis (FTA)-Event Tree Analysis (ETA)-Failure Mode &Effect Analysis (FMEA)-FMEA Methodology-Types Of FMEA-When To Use FMEA-FMEA Procedure-Steps-Risk Priority Number-Control Measure OF FMEA.

UNIT IV HAZARD IDENTIFICATION & RISK ASSESSMENT

HIRA- Objectives of HIRA study-Principles of risk assessment Steps involved in Hazard identification and risk assessment- Identification of the Hazard- Risk Analysis- Evaluation of Hazard and Risk –Risk Matrix-Risk Control Method-Preventive Measure- Control Measure-Reporting-Implementation &Monitoring-Reviewing-Types of Risk Assessment-Quantitative and Qualitative Risk Assessment-Specific Site Assessment.

U**NIT V CREDIBILITY OF RISK ASSESSMENT TECHNIQUES**

Past accident analysis as information sources for Hazard analysis and consequences analysis of chemical accident, Mexico disaster, Flixborough,Bhopal, Seveso, Pasadena,Feyzin disaster (1966), Port Hudson disaster-convey report.

References:

1. ENVH 577 Readings (On Canvas site)
2. Harr, J., A Civil Action. Vintage Press, 1996 (on reserve at HS Library)
3.Devra Davis, When Smoke Ran Like Water: Tales of Environmental Deception and the Battle Against Pollution.
4.Phil Brown (editor), Health and the Environment **(HTE)**

Related online content (MOOC, Swayam,NPTEL, Website etc.)

www.atsdr.cdc.gov/HAC/HAGM/

www.epa.gov/superfund/programs/risk/ragsa/index.htm

Course outcomes		**Knowledge level**
CO-1	To Recall Fundamentals of Hazard and Risk with concept of ALARP	K1
CO-2	To Illustrate Risk analysis methods with Risk Identification	K2
CO-3	To Interpret Safety Management tools with HAZOP	K4
CO-4	To Justify HIRA with Risk Matrix and Risk Control Methods	K5
CO-5	To Elaborate credibility of Risk Assessment Techniques	K6

M.SC (IS&H)III -Semester					
Core	**Course code: 70133**	**Safety Audit and Inspection**	**T**	**Credits:4**	**Hours:4**
Pre-requisite	**Basic Knowledge of Safety Inspection and audit**		**Syllabus Revised**		**2023-2024**
Course Objectives	1.To achieve understanding of safety inspection and audit 2.To enable students to conduct safety audit and write audit report effectively in auditing situation 3.The course could provide basic knowledge of OHSMS and EMS 4.To educate about the various steps to be taken for certification of ISO 14001(EMS) 5.To impart knowledge on environmental impact assessment, life cycle assessment of product and principles of eco labeling				

Unit I-SAFETY INSPECTION

Importance of Workplace Inspection Planning of Workplace Inspection Purpose of Workplace Inspection Hazards in Workplace Information's Required in Workplace Inspection Report Inspection Team Duration of Inspection - Frequency of Inspection - Follow up & Monitoring - Summary

Unit II-SAFETY AUDIT

Introduction Types of Audits Audit Objectives Methodology to Conduct Safety Audit- Pre Audit Activities - Background Information to be Gathered Data to be Gathered - On Site Activities - Understanding Management Systems Assessing Strengths & Weaknesses - Collecting Audit Evidence - Interviewing - Observation Evaluating Audit Evidence Reporting Audit Findings - Post Audit Activities.

Unit-III-OH & S MANAGEMENT SYSTEM STANDARD

Introduction to ISO 45001 – Development of various OHSMS standards – aim of OH & S management system–success factors– plan do check act cycle- contents and scope of ISO 45001- terms and definitions –leadership and worker participation –leadership and commitment - OH & S policy- organizational roles and responsibilities and authorities – consultation and participation of workers

UNIT- IV ISO 14001

EMS, ISO 14001, specifications, objectives, Environmental Policy, Guidelines and Principles (ISO 14004), clauses 4.1 to 4.5. Documentation requirements, 3 levels of documentation for a ISO 14000 based EMS, steps in ISO 14001

UNIT V- ENVIRONMENT IMPACT ASSESSMENT

ISO 14040(LCA), General principles of LCA, Stages of LCA, Report and Review. ISO 14020 (Eco labeling) – History, 14021, 14024, Type I labels, Type II labels, ISO 14024, principles, rules for

eco labeling before company attempts for it. Advantages. EIA in EMS, Types of EIA, EIA methodology EIS, Scope, Benefits.
References 1. ISO 45001: 2018 –Occupational Health and safety management systemsRequirements with guidance for use 2. ISO14001:2004, Environmental Management SystemsRequirements with Guidance for Use" ,ISO, 2004. 3. "Guidelines on Occupational Health and Safety Management Systems (OSH-MS)"International Labour Organization, 2001 4. Heinrich H.W. "Industrial Accident Prevention" McGraw-Hill Company, New York, 1980 5. John Ridley, "Safety at Work", Butterworth and Co., London, 1983
Related online content (MOOC, Swayam,NPTEL, Website etc.)
https://archive.nptel.ac.in/courses/110/105/110105160/
https://onlinecourses.nptel.ac.in/noc23_mg48/preview

Course outcomes		**Knowledge level**
CO-1	To recall basic safety audit and prepare a report for safety audit	K1
CO-2	To Illustrate safety inspection and prepare a report for safety inspection	K2
CO-3	To interpret various standards for maintaining OHSMS	K4
CO-4	To Justify ISO 14001standards on Safety audit and inspection	K5
CO-5	To Discuss EIA and ecosystem development	K6

M.SC (IS&H) III -Semester					
Core	**Course code: 70134**	**Safety at Oil and Gas & Nuclear Sector**	**T**	**Credits:4**	**Hours:4**
Pre-requisite	**Basic Knowledge of Safety at Oil and Gas & nuclear sector**		**Syllabus Revised**		**2023-2024**
Course Objectives	1.To give basic information aboutoil and gas work process 2. To Analyze Root cause and reliability analysis in Oil and Gas industries 3.To Regulate Safety norms and procedures in Offshore 4. To gain knowledge in reactor types, design considerations and their operational problems. 5. To know the current safety trends in nuclear energy.				

UNIT-1 INTRODUCTION TO OIL AND GAS SAFETY

Introduction –upstream –down stream- mid stream- safety management principle –product hazard classification – product organization task-common cause of work injuries –differentiate of onshore and offshore –accident caution theory- human error occurrence reasons and consequences-bath tub hazard curve

UNIT -2 SAFETY ANALYSIS METHODS AND RELIABILITY ANALYSIS IN OIL AND GAS INDUSTRY

Introduction –root cause analysis-HAZOP(hazards and operability analysis)-interface safety analysis-job safety analysis-preliminary hazards analysis-failure mode of effective analysis-fault tree analysis-markov methods-daily observation report –safety checklist.

UNIT-3 OFFSHORE SAFETY

Introduction –Who regulates the offshore safety- consequences of not fallowing safety -offshore industrial risk picture-offshore worker situation awareness concept-studies and result –offshore industry accident reporting procedure –important of regular inspection of machinerycommon hazards in oil and gas industry-explosion and fire hazards-recommendation reduce fatal oil and gas industry accident- work permit system.

UNIT- 4 SAFETY OF NUCLEAR REACTORS

Safety design principles – engineered safety features – site related factors – safety related systems – heat transport systems – reactor control and protection system – fire protection system – quality assurance in plant components – operational safety – safety regulation process – public awareness and emergency preparedness. Accident Case studies- Three Mile island and Chernobyl accident.

UNIT- 5 RADIATION CONTROL

Radiation shielding – radiation dose – dose measurements – units of exposure – exposure limits – barriers for control of radioactivity release – control of radiation exposure to plant personnel – health
physics surveillance – waste management and disposal practices – environmental releases.

References

1. B.S. Dhillonm, safety and reliability in the oil and gas industry apractical approach, CRC press, Taylor and francis group 2016.
2. Alireza bahadori, personnel protection and safety equipment for oil and gas industries, gulf professional publishing of Elsevier group 2015
3. Abdul khalique, Basic offshore safety, routledge 2016
4. Loss prevention in the process Industries" Frank P.Lees Butterworth-Hein-UK, 1990.
5. Loffness, R.L., "Nuclear Power Plant" Van Nostrand Publications, 1979

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https://archive.nptel.ac.in/courses/114/106/114106017/

https://archive.nptel.ac.in/courses/103/106/103106071/

Course outcomes		**Knowledge level**
CO-1	To Recall the functions of upstream, midstream and downstream segments	K1
CO-2	To Explain Work related to oil and gas industry covering flammability limits, explosive hazards, and other hazards related to health, safety and environment	K2
CO-3	To describe offshore oil and gas industry who are responsible for ensuring safety, health and security for workers as part of their daily routines.	K1
CO-4	To Compare types of reactors and their Control requirements.	K5
CO-5	To Elaborate the safety design principles and safety regulation process.	K6

M.SC (IS&H) III -Semester					
Core	**Course code: 70135**	**CONFINED SPACE & RESCUE OPERATION PRACTICAL**	**P**	**Credits:4**	**Hours:8**

EXPERIMENTS

1.Practise on gas detecting / testing and other inspection of toxic gases.
2.Practise on entry into confined space and rescue operation.
3.Practise on work permit system for confined space entry.
4.Purging/cleaning/removing of toxic gases or any other flammable gases.
5.Direct supervision of confined space attendant / hole watcher.

REQUIREMENTS

1.Portable Gas tester.
2.Proper safety sign boards.
3.Suitable fire extinguisher.
4.First aid box.
5.Emergency escape breathing apparatus.
6.Required PPE.

OUTCOMES

The students will be able to
1.To Operate gas detecting and testing for inspection of toxic gases
2.To Assess Entry and rescue operation in confined space
3.To Evaluate work permit system for confined space entry
4.To Priorities Cleaning and removing of toxic and flammable gases
5.To describe about direct supervision of confined space to Hole watcher and Confined space attendant.

REFERENCES

1.Health Safety and Environment-Training Manual-Oil & Gas Sector-SPIC
2.Tata Mc Graw Hill-Industrial Safety Management-I.M Deshmukh-2016

M. Sc (IS & H) III -Semester					
Elective	**Course code: 70136A**	**Safety Management Systems**	**T**	**Credits:3**	**Hours:3**
Pre-requisite	**Basic Knowledge of Safety management systems**		**Syllabus Revised**		**2023-2024**
Course Objectives	1. To provide knowledge about Safety Management and accident prevention with Financial direct and indirect costs and management Information systems. 2. To impart knowledge on planning and organizing for safety in an industry 3. To acquire knowledge on Training methods and out of plant training programmes 4. To Understand the employee participation in safety with techniques of safety promotion				

UNIT - I SAFETY MANAGEMENT AND ACCIDENT PREVENTION

History of Safety Management in India and abroad- Need for safety, legal,Economic and Social Considerations, OSHAS / IS- 18001 - Role of managementin Industrial safety- Management principles & practices- Theories of AccidentOccurrences -Principles and Modals of Accident Prevention, Near miss incident -Financial costs direct and indirect, Social Costs of accidents – Compilationprocedures for financial costs - Budgeting for Safety- Economic Evaluation andmethods in safety promotion - Management Information System (MIS) - Sources,

Protection, Collection and compilation of SHE information - Use of ModernMethods of Programming, Storing and Retrieval of MIS for SHE, Use of IT Toolsin managing SHE systems.

UNIT – II- PLANNING AND ORGANISING FOR SAFETY

Safety Policy- Formulation and Cascading down the organization - Variety / Forms of plans -Strategic Planning and Process of Implementation - Management by Objectives and its Role in safety - Effective Planning for Safety - Haddon's Principle- Safety Department- Organization Structure - Functions and Responsibilities - Authority Power and Qualifications / Attributes of Safety Officer Department - Effective System of Communication for SHE - Barriers and Break downs in communication - Communication with Management Employees & Trade

Union Communication and Group Dynamics - Modes of Communication - Manageable Communication.

UNIT - III SAFETY, HEALTH AND ENVIRONMENT EDUCATION ANDTRAINING

Assessment of Needs- Tool box talk design & development of training programme - Training methods and strategies- Modern Methods of Safety Training - E- Learning - In-plant training programmes- Out-of-plant training programmes, Seminars, Programmes for new workers- Training of Manager, Supervisors &Workers Evaluation and review of Training Programmes -Induction Training -Training for Contractors and visitors - Integrating safety into Operating Procedures - Job Instructions Vs Safety Instructions.

UNIT - IV EMPLOYEE PARTICIPATION IN SAFETY

Purpose, Nature, Scope and methods - Importance of Employee / Participation – history of trade Unions in India, Role of Trade Unions in Safety, Health and Environment integrating SHE in Collective Bargaining - Safety Suggestion Schemes - Safety Competitions - Safety Incentive Schemes - Promotional Methods - Performance - Appraisal - Modern Methods and Techniques of Safety Promotion.

UNIT - V BEHAVIOURAL SAFETY

Organizational behavior - Human Factors Contributing to Accidents - Psychological aspects Of Safety, Safety Culture System - Individual differences -Behavior as function of sell situation - Perception of danger and acceptance of risks - Knowledge and responsibility Vis-a-Vis Safety performance - Theories of motivation and their application of safety - Role of management, Supervisors and Safety department in motivation - Ethical issues.

References

1. Ray Asfahl. C "Industrial Safety and Health Management" Pearson Prentice Hall,2003.
2. John V. Grimaldi and Rollin H. Simonds, "Safety Management", All IndiaTravelers Book seller, New Delhi, 2001
3. Krishnan, N.V. (1997). Safety management in Industry. Jaico Publishing House, NewDelhi.
4. John V. Grimaldi and Rollin H.Simonds. (1989) Safety management. All India TravellerBook Seller, Delhi.
5. Ronald P. Blake. (1973). Industrial safety. Prentice Hall, New Delhi.

Related online content (MOOC, Swayam,NPTEL, Website etc.)

https://nptel.ac.in/courses/110105160

https://www.digimat.in/nptel/courses/video/110105160/L01.html

Course outcomes		**Knowledge level**
CO-1	To recall basic concepts of accident occurrences and accident prevention based on OSHAS / IS- 18001	K1
CO-2	To Explain about Safety policy with Effective system of communication	K2
CO-3	To Interpret Modern methods of Safety Training	K4
CO-4	To Evaluate Safety Incentive Schemes with Promotional Methods	K5
CO-5	To Elaborate Organizational beahviour with Psychological aspects of Safety	K6

M. Sc (IS & H) III -Semester					
Elective	**Course code: 70136B**	**Safety in Fire Works**	**T**	**Credits:3**	**Hours:3**
Pre-requisite	**Basic Knowledge of Fireworks safety**		**Syllabus Revised**		**2023-2024**
Course Objectives	• Tostudythepropertiesof pyrotechnicchemicals • Toknowaboutthe hazardsinthemanufactureof variousfireworks • Tounderstandthehazards infireworksindustries relatedprocesses • Tostudytheeffectsofstaticelectricity • Tolearnpyrotechnicmaterialhandling,transportationandusersafety				

UNITI PROPERTIES OFFIREWORKS CHEMICALS

Fire properties – potassium nitrate (KN03), potassium chlorate (KCl03), barium nitrate (BaNO3),calcium nitrate (CaNO3), Sulphur (S), Phosphorous (P), antimony (Sb), Pyro Aluminum (A1) powder-Reactions-metal powders, Borax, ammonia (NH3) – Strontium Nitrate, Sodium Nitrate, Potassium perchloride. Fire and explosion, impact and friction sensitivity.

UNITII STATIC CHARGEAND DUST

Concept-prevention-earthing-copperplates-dressmaterials-staticchargemeterlightning,Causes-effects-hazardsinfireworksfactories-lightningarrestor:concept-installation-earthpit-maintenance-resistance-legalrequirements-casestudies.Dust:size-desirable,non-respirable-biologicalbarriers-hazards-personalprotectiveequipment-pollutionprevention.

UNITIII PROCESS SAFETY

Safe-quantity, mixing-filling-fuse cutting – fuse fixing – finishing – drying at various stages-packing-storage-hand tools-materials, layout: building-distances- factories act – explosive act and rules – firepreventionand control –riskrelatedfireworksindustries.

UNITIV MATERIAL HANDLINGANDTRANSPORTATION:

Manual handling – wheel barrows-trucks-bullock carts-cycles-automobiles-fuse handling – paper capshandling-nitric acid handling in snake eggs manufacture-handling the mix in this factory-materialmovement-godown-wastepit.Packing-magazine-designofvehiclesforexplosivetransportsloadingintoautomobiles-transportrestrictions-case studies-overhead power lines-driver habits-intermediate parking-fire extinguishers-loosechemicalshandling andtransport.

UNITV WASTE CONTROLANDUSER SAFETY

Concepts of wastes – Wastes in fireworks-Disposal-Spillages-storage of residues. Consumer anxiety-hazards in display-methods in other countries-fires, burns and scalds-sales outlets-restrictions-role offireservice.

References

1. “Seminaronexplosives”,Dept.ofofexplosives.
2. J.A.Purkiss,“Fireworks-FireSafetyEngineering”
3. Billofonce,“FireworksSafetymanual”
4. “Goeff,“DustExplosionprevention,Part1”
5. A.Chelladurai,“Fireworksrelatedaccidents”

Related online content (MOOC, Swayam,NPTEL, Website etc.)

https://www.nfpa.org/Public-Education/Fire-causes-and-risks/Seasonal-fire-causes/Fireworks		
https://onlinecourses.nptel.ac.in/noc22_me37/preview		
Course outcomes		**Knowledge level**
CO-1	ToDescribe about thechemicalreactionsof Fireworks chemicals	K1
CO-2	ToExplain the safemanufacture ofFireworks items	K2
CO-3	ToSimplify the processsafetyinfireworksindustries	K4
CO-4	ToJustify the safetymeasuresapplicableagainststaticelectricity	K5
CO-5	ToElaboratesafepracticesforhandlingoffireworks infactories,transportandatuserend	K6

M. Sc (IS & H) III -Semester					
Core	**Course code: 70136C**	**APELL**	**T**	**Credits:3**	**Hours:3**
Pre-requisite	**Basic Knowledge of Disaster management and APELL**		**Syllabus Revised**		**2023-2024**
Course Objectives	1. To provide basic conceptual understanding of disasters 2.To understand approaches of Disaster Management 3. To build skills to respond to disaster 4.To evaluate the training and awareness program 5. To gain knowledge in health hazards and safety in demolition work				

UNIT: I Definition And Types Of Disaster

Hazards and Disasters, Risk and Vulnerability in Disasters, Natural and Man-Made Disasters, Earthquakes, Floods Drought, Landside, Land Subsidence, Cyclones, Volcanoes, Tsunami, Avalanches, Global Climate Extremes. Man-Made Disasters: Terrorism, Gas and Radiations Leaks, Toxic Waste Disposal, Oil Spills, Forest Fires.

UNIT – II - Disaster Management

Definitions, History and Relevance. Resilience Building. Disaster Cycle: Risk Management- Risk Identification, Risk Reduction (Planning, Prevention, Mitigation, Preparedness), Risk Transfer; Crisis Management- Response (Search ad Rescue), Relief, Recovery and Reconstruction. Multi-Disciplinary Character of DM.

UNIT: III Mitigation And Management Techniques Of Disaster

Basic Principles of Disasters Management, Disaster Management Cycle, Disaster Management Policy, National and State Bodies for Disaster Management, Early Warming Systems, Building Design and Construction in Highly Seismic Zones, Retrofitting of Buildings.

UNIT IV Training, Awareness Program And Project On Disaster Management

Training And Drills For Disaster Preparedness, Awareness Generation Program, Usages Of Gis And Remote Sensing Techniques In Disaster Management, Mini Project On Disaster Risk Assessment And Preparedness For Disasters With Reference To Disasters In India And Tamilnadu.

UNIT – V - Disaster Administration & Mitigation And Management Techniques Of Disaster

United Nations and Its Disaster Management Mechanism - UNDP, UNDRR, WHO. Disaster Administration in India: APELL - Disaster Management Authority at National, State and District Levels; Allied Governmental Bodies, Institutions and Mechanisms/Resources for Disaster Management; State And National Disaster Mitigation Funds. Gaps In Disaster Policy And Administration. Basic Principles of Disasters Management, Disaster Management Cycle, Disaster Management Policy, National and State Bodies for Disaster Management, Early Warming Systems, Building Design and Construction in Highly Seismic Zones, Retrofitting of Buildings.

REFERENCE: -

1. Disaster Management Guidelines, GOI-UND Disaster Risk Program (2009-2012)
2. Damon, P. Copola, (2006) Introduction to International Disaster Management, Butterworth Heineman.

3. Gupta A.K., Niar S.S and Chatterjee S. (2013) Disaster management and Risk Reduction, Role of Environmental Knowledge, Narosa Publishing House, Delhi.
4. Murthy D.B.N. (2012) Disaster Management, Deep and Deep Publication PVT. Ltd. New Delhi.
5. Modh S. (2010) Managing Natural Disasters, Mac Millan publishers India LTD.

Related online content (MOOC, Swayam,NPTEL, Website etc.)

https://onlinecourses.nptel.ac.in/noc21_ce16/preview

https://archive.nptel.ac.in/courses/105/102/105102206/

Course outcomes		**Knowledge level**
CO-1	To describe the various types of disasters	K1
CO-2	To explain about disaster management system.	K2
CO-3	To examine the management cycle.	K4
CO-4	To determine the training program	K5
CO-5	To create the APELL	K6

M. Sc (IS & H) III -Semester					
Non-Major Elective	**Course code: 70137**	**Food Hygiene and Sanitation (HACCP)**	**T**	**Credits:2**	**Hours:3**
Pre-requisite	**Basic Knowledge of Food hygiene and its safety**		**Syllabus Revised**		**2023-2024**
Course Objectives	1. To learn about food quality 2. To learn about physical, chemical and biological contamination in food and sanitation. 3. To learn the quality, challenges in food industry. 4. To learn basics about food quality auditing. 5. To learn the chemical, technological and toxicological aspects of food additives and food contaminants and the legal and socio-economic aspects of biotechnology				

UNIT I Food Quality

Objective and Importance of Quality Control, Classification of Quality Attributes and its Role in Food Quality, Quality Assessment of Food Materials (Fruits, Cereals, Milk And Meat), Types of Quality Characteristics of Food, Methods Used for Determination of the Quality in Food Industry, Factors in Fluencing the Quality of Food, Sample and Sampling Methods of Quality Evaluation.

Unit II Food Sanitation

Factors Contributing to Physical, Chemical and Biological Contamination in Food Chain, Prevention and Control of Food Borne Hazards, Definition and Regulation of Food Sanitation, Sources of Contamination, Personal Hygiene-Food Handlers, Cleaning Compounds, Sanitation Methods and Pest Control, Sanitation and Safety in Foodservices.

Unit III Food Safety

Principles of Food Safety and Quality, Quality Assurance, Total Quality Management (TQM). Good Agricultural Practices (GAP), Good Manufacturing Practices (GMP), Good Hygienic Practices (GHP), Good Veterinary Practice (GVP), Risk Analysis, Risk Assessment, Risk Management. Applications Of HACCP In Food Safety, Current Challenges to Food Safety.

Unit IV Food Laws And Regulations

Basic Concepts of Food Standards, Role of National Regulatory Agencies: Food Safety and Standards Act: Salient Provision and Prospects, FSSAI, PFA, Certification- AGMARK, ISI (BIS). Role Of International Regulatory Agencies: USDA, FDA, BRC, WHO, FAO, Codex Alimentarius Commission, WTO Agreements: SPS and TBT Agreements, ISO and its Standards for Food Quality and Safety (ISO 9000, ISO 17025, ISO 22000, And Iso14000).

UNIT V Food Safety Auditing

Food Surveillance: International and National Practices, Procedure and Protocols, Food Alerts, Traceability and Food Product Recall. Export and Import of Food in India: Introduction, Import and Export Policies, FDA Import Policy, Export-Import Policy, Export Control Systems. Import Intelligence and Alert Systems, Packaging and Labelling, Specifications and Certifications.

References

1. Handbook of OSHA Construction safety and health charles D. Reese and James V. Edison
2. Hudson, R.,"Construction hazard and Safety Hand book, Butter Worth's, 1985.
3. Jnathea D.Sime, "Safety in the Build Environment", London, 1988.
4. V.J.Davies and K.Thomasin "Construction Safety Hand Book" Thomas Telford Ltd., London, 1990

Related online content (MOOC, Swayam,NPTEL, Website etc.)

https://onlinecourses.nptel.ac.in/noc21_ce16/preview

https://archive.nptel.ac.in/courses/105/102/105102206/

Course outcomes		**Knowledge level**
CO-1	To Understand the food quality in food industry	K1
CO-2	To Identify the food additives and food contaminants and their chemical and toxicologicalproperties.	K2
CO-3	To Recognize the effects of pests on food and the various methods for controlling them	K4
CO-4	To Attain knowledge about the national and international regulations for biosafety.	K5
CO-5	To Demonstrate an ability to recognize the environmental, social and ethical implications ofbiotech applications.	K6