

**COMPULSORY SAFETY AND HEALTH COURSE FOR ENGINEERING AND
NON ENGINEERING PROGRAM IN UNIVERSITY TUN HUSSEIN ONN (UTHM)
MALAYSIA**

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ABSTRACT

Education is one of the social mobility to develop the nation. In University, the program that was developed must meet the requirement from the stake holder and as well as industries. The Safety and Health course is University Tun Hussein Onn Malaysia is compulsory and it was offered in second year for the Diploma and First Degree program. The introduction of these courses was taking into account the knowledge given to student as per preparation before this student goes to Industrial Training. The industrial accident and the occupational diseases statistics of Malaysia need to be study and it is evidence why the safety and health issues and problems should be prevented. The course that was developed hopefully will be beneficiaries to all involve parties. The Safety and Health culture towards the total management for Malaysia has been established for Occupational Safety and Health Malaysian Plan 2015. So the future engineers and technologist must be preparing with the knowledge and better understanding for built a better world.

Keywords: Safety and Health, Engineering, Engineering Technology.

1. INTRODUCTION

Organization worldwide strives to develop their management system for business functions, ranging from quality and environment to safety, information security and social responsibility. For the latest decade a considerable amount of these efforts has been concentrated on introducing and applying standards such as the ISO 9001 and ISO14001 (Eriksson and Hansson, 2006). Numerous manufacturing and service organization are considering integrating their respective occupational and safety management and audit systems into the International Organization for Standardization (ISO) based audit driven quality management system (ISO 9000) or environmental management system (ISO 14000) models (Dyjack et al, AIHA, 1998). The need for Integrated Management System (IMS) often arises as a result of decisions to implement Environmental Management System (EMS) and occupational safety and health management system in addition to a Quality Management System (QMS). Thus the development of standard from various sources emerged. A good example is the series of the OSHAS 18001: 2007 and OSHAS 18002:2008. The OSHAS 18001 is compatible with ISO 9001:2000 (Quality) and the ISO 14001:1996 (Environmental) management system standards, which can facilitate the integration of quality, and environment OSH management system individual organization (BSI, OHSAS 18001:1999). Malaysia has also introduced the Malaysian standard and the latest is MS ISO 9001: 2008 and MS 1722: 2003. Malaysian Standard also emphasizes on the employer understanding and take the opportunity to improve on the quality aspect.

People worldwide face occupational safety and health hazards daily. Over the years, the global occupational hygiene community has worked diligently to develop ways to protect workers, in workplaces of all types and sizes. Standards and guidelines were developed to help the employers and employees to develop their OSH Management system. A standard is an agreed, relatable way of doing something. It is published document that contains a technical specification or other precise criteria designed to be used consistently as a rule, guideline, and definition. Standards help to make life simpler and increase the reliability and the effectiveness of many goods and services. It is created by bringing together the experience and the expertise of all interested parties such as the producers, sellers, buyers, users and the regulators of particular material, product, process or service. Standards are designed for voluntary use. However, laws and regulations may refer to certain standards and make compliance with them compulsory (British Standard, 2009). In this study certain standards were referred based on the Malaysian standard requirements. MS 1722: Part 1: 2005, Occupational Safety and Health Management Systems-Part 1: Requirements was establish to guide the company on safety and health aspect. MS 1722: Part 2: 2003, OSH Managements Systems-Part 2: Guidelines was developed to give the understanding to the company and guidance to employer to build up the Occupational

Management System. From the environment aspect, the study also will look at the MS ISO 14001: 2004, Environment Management System (EMS) Requirements with Guidance for use.

2. OSH MALAYSIAN PERSPECTIVE

Occupational safety and health (OSH) management system is one of the ways to push forward the safety and health approach and it is apply to the 10 industrial sectors in Malaysia. The establishments of OSH management system worldwide are the key to sustainable development. This paper were highlighted some of the key factor why OSH management system must put into organization practice. The overviews on OSH Malaysian perspective were mentioned about the history of Malaysian OSH development. OSH Standards and guidelines approach from a various party's involvement and System Model is the guide to implementation of OSH management system from BS OHSAS 18001:2007. The Malaysian standard MS 1722: 2003 has significant impact to the whole management system development. The OSH management system created by organization should be implementing widely. The government was target to reduce the industrial accident and occupational diseases through the OSH Malaysian Plan 2015. The university involvement through education program is so important to make sure the safety and healthier work environment has become a reality.

OSH provides a working environment which is conducive to workers. Reasonable precautionary steps are taken so as to ensure that workers are prevented from injury or health hazard due to work activities being carried out. Occupational safety and health (OSH) was first implemented in Malaysia some 130 years ago towards the end of the 19th century (DOSH 2007). In 1953 initially, the formation of the OSH was managed by Factories and Machineries Department. Its main activities were to ensure machinery safety and also the safety and health of workers in the manufacturing sector. With the rapid growth of technology and the economic development of the country, the department no longer focused solely on the manufacturing sectors, but also other occupational sectors. Hence, the Factories and Machineries Department was upgraded to the Department of Occupational Safety and Health (DOSH) in 1994, where its main focus is to ensure the safety, health and welfare of people at workplace and to protect others from the danger arising from occupational activities.

DOSH is the only government agency responsible for administrating, managing and enforcing legislation pertaining to OSH in the country with the vision of making all occupations safe and healthy while enhancing the quality of working life (OSHA, 1994). From the DOSH report, the industrial accident statistic was tabulated in Table 2.1. The data describes the number of industrial accidents occurred by sector from year 2005 to 2009. It shows that the number of industrial accident is quite high especially for manufacturing sector.

Table 2.2 presents a total number of investigation cases of occupational diseases and poisoning. For the occupational disease, The Occupational Health Division monitors and analyses the data

received. For each case of occupational disease and poisoning that is investigated, the department advises the industries to take corrective measures to prevent from recurrence. To ensure the safety, health and welfare of workers are taken care; DOSH work towards making sure that the occurrence of industrial accidents in Malaysia is low, by introducing the OSH Master Plan 2015. This plan provides the direction of OSH in the country, and function as a guide for working cohesively with stakeholders and social partner, including government agencies, local authorities, labor unions, employer associations, academic institutions and other non-governmental organization. Small and Medium Industries (SMI) sector has been identified as the major source of accidents in the manufacturing industry. New strategies had therefore been introduced to reduce the accidents and to increase the level of awareness for the compliance with the Factories and Machinery Act, 1967 and Occupational Safety and Health Act, 1994.

So the education is the best situation to deliver the knowledge to the student. Hence, the development of the safety and health culture were being introduced since university. The levels of education are divided to 3 categories which is:

- i. Short Course/ Seminar
- ii. Diploma
- iii. Degree

3. THE WAY OF IMPLEMENTATION

In the University of Tun Hussein Onn Malaysia, 48 programs on Diploma level and First Degree level were offered. The nature of the education is divided with two main programs (engineering and non-engineering). Some of the programs include safety as a core courses and the others made it elective courses. In this situation the curriculum development has figure out the important of safety and health as a tool to the occupation and productivity. Through the meeting and discussion, the decision has been made that the Occupation Safety and Health course is compulsory to engineering and non-engineering whether from diploma level or first degree level. At the same time, the university also has conducted a several course and seminar regarding occupational safety and health. From the whole structure of curriculum, occupational safety and health course basically was scheduled in second year. The reason is the student start to run the laboratory testing and some or workshop work need to be done as per request of core subject in the curriculum. The other reason is student must prepare with their knowledge to identify the hazard, assess the risk and minimize the risk before they proceed to the Industrial Training in the 3rd year. Table 3 below shows the example of curriculum structure. Table 4 shows a curriculum summary

4. DISCUSSION

The implementation of occupational safety and health in education program is one of the method to introduced the occupational safety and health and it also the way to develop safety and health culture for the nation. In the reality, the set target to enhance the capability of diverging the knowledge based on this syllabus.

4.1 Goal

To provide knowledge and skills in occupational safety and health at workplace.

4.2 Learning Outcomes

Upon completion of the course, students should be able to:

1. Design safety and health program to meet the work place requirements.
2. Perform according to the most current acts pertinent to the Occupational Safety and Health.
3. Adopt current technique on reporting of accident/incident according to OSHA 1994, FMA 1967 or DOSH requirements. (A3, PLO8)

4.3 Synopsis

This course introduces students to knowledge and skills in occupational safety and health in workplace. Scope of study includes Health, Safety and Environment Managements: introduction to OSH, OSHA 1994 (Act 514), FMA 1967, EQA 1974, occupational safety and health management system, safety, health and environment culture; Risk Management and Assessment: introduction to risk management, risk assessment techniques, HIRARC; Physical Injury & Controls: introduction to physical injury, construction work, electrical work, mechanical work, chemical work; Health Hazards: introduction to health hazards & hygiene, chemical hazards, physical hazards, biological hazards, hygiene; Accident Investigation & Reporting: introduction, accident investigation, investigations and causes of incident, incident analysis and data collection method

From the syllabus, the content are basically have 5 main topics such as:

- i. Health, Safety And Environment Management
- ii. Risk Management And Assessment
- iii. Physical Injury And Controls
- iv. Health Hazards
- v. Accident Investigation And Reporting

Then the expectation that the learner (student) will use the kind of practical as a real training based on the Malaysia legislative (act) and regulation. The implementation of variety technique of teaching and learning approach will help the student do responsible to their self and the surrounding. The OSH standard also will be used as a teaching material while developing the

practical question. The case study will be adopted to ensure the student has an idea how to solve the matters regarding OSH. The assessment and evaluation based on this criteria:

- i. Course work : 60 %
- ii. Final Exam : 40 %

5. CONCLUSION

The occupational safety and health culture must be implemented during formal and non-formal education. The engineering and non-engineering courses need to be justified on what hazard that will be exposed and what kind of risk need to be estimated by the student before they graduate. The Hazard Identification, Risk Assessment and Risk Control (HIRARC) approach as a key element to be introduced as a part of Occupational Safety and Health syllabus in the University Tun Hussein Onn Malaysia (UTHM).

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Table 2.1. Industrial Accidents Statistics by sector from 2005-2009

Sector /Year	Year 2005			Year 2006			Year 2007			Year 2008			Year 2009		
	D	PD	NPD	D	PD	NPD	D	PD	NPD	D	PD	NPD	D	PD	NPD
Manufacturing	65	93	2058	66	116	2752	63	133	2094	76	134	1564	63	90	1419
Mining and Quarrying	3	4	107	2	1	22	9	1	5	6	0	4	3	1	2
Construction	87	36	246	81	25	365	95	10	76	72	2	55	71	6	38
Agriculture and Forestry	18	23	614	32	19	1014	30	14	712	42	7	365	44	8	440
Utility	2	20	177	5	6	66	10	4	51	19	12	82	23	3	116
Transport & Communication	14	0	145	10	1	47	2	0	7	8	1	18	18	0	21
Wholesale and retail	2	3	53	0	1	13	3	1	11	0	0	2	0	0	0
Hotel and restaurant	3	1	27	0	0	7	0	2	11	1	1	13	0	0	18
Financial & Real Estate	0	0	10	4	2	18	4	0	25	4	1	2	1	0	0
Public Services	2	2	22	9	3	44	3	3	16	2	1	3	1	0	0
Total	196	182	3459	209	174	4348	219	168	3008	230	159	2108	224	108	2054

Source: DOSH annual report 2007, 2008 and 2009.

Legend: D -Death

PD -Permanent Disability

NPD -Non-Permanent Disability

Table 2.2. Total Number of Investigation Cases of Occupational Diseases and Poisoning from 2005 to 2009

No.	Types of Disease	2005	2006	2007	2008	2009
1.	Occupational Lung disease (OLD)	51	38	50	56	57
2.	Occupational Skin Disease (OSD)	57	30	192	70	53
3.	Occupational Noise Hearing Loss (NIHL)	190	106	120	169	427
4.	Occupational Muscular Skeletal Disorder (OMD)	10	22	18	31	57
5.	Disease caused by chemical agent (poisoning)	139	116	117	41	61
6.	Disease caused by biological agent	0	3	1	2	3
7.	Occupational Cancer	0	2	1	3	2
8.	Other and Non- Occupational Disease	4	45	47	81	2
TOTAL		451	362	546	453	669

Table 3. The occupational safety and health course

CORE/ GENERAL MODULE	MATHEMATICS	CODE	COURSE	C	L	T	P	SLT
		BWM 12203	Mathematics for Engineering Technology I	3	2	2	0	4
		BWM 12303	Mathematics for Engineering Technology II	3	2	2	0	4
		BWM 22403	Mathematics for Engineering Technology III	3	2	2	0	4
		BWM 22502	Statistics for Engineering Technology	2	1	2	0	3
	PROFESSIONAL DEVELOPMENT MODULE	BNJ 10802	Computer Programming	2	1	0	3	4
		BPK 20802	Entrepreneurship	2	1	0	2	3
		BNJ 21102	Occupational Safety & Health	2	1	0	3	4
		BNJ 20602	Management and Professional Ethics	2	2	0	0	2
		TOTAL		19	12	8	8	28

Legend: C: Credit, L: Lecture, T: Tutorial, P: Practical, SLT: Student Learning Time

**Table 4. Curriculum Summary of Degree in Mechanical Engineering
Technology (Plant) with honours (BNL)**

Year	Semester	Code	Courses	Credit	Total
1	I	UWB10102	Academic English	2	18
		UWA10102/202	Islamic Studies / Moral Studies	2	
		UWS 10103	Malaysian Nationhood and Current Development	3	
		UWB 10*02	Foreign Language	2	
		UQ* 1***1	Co-Curriculum I	1	
		BNJ 10302	Creativity and Innovation	2	
		BWM 12203	Mathematics for Engineering Technology I	3	
		BNJ 10102	Engineering Drawing	2	
	BNJ 17001	Engineering Laboratory I	1		
	II	UWA 10302	Islam Civilisation and Asian Civilisation	2	18
		UWB 10202	Effective Communication	2	
		UWS 10202	Ethnic Relationship	2	
		UQ* 1***1	Co-Curriculum II	1	
		BWM 12303	Mathematics for Engineering Technology II	3	
		BNJ 1502	CAD and Modelling	2	
		BNJ 10203	Statics	3	
	III	BNJ 10802	Computer Programming	2	3
		BNJ 18001	Mechanical Engineering Practice I	1	
2	I	UWB 20302	Technical Writing	2	18
		BWM 22403	Mathematics for Engineering Technology III	3	
		BPK 20802	Entrepreneurship	2	
		BNJ 17101	Engineering Laboratory III	1	
		BNJ 20203	Fluid Mechanics	3	
		BNJ 10403	Solid Mechanics	3	
		BNJ 20102	Dynamics	2	
	BWM 22502	Statistics for Engineering Technology	2		
	II	BNJ 21102	Occupational Safety and Health	2	18
		BNJ 20203	Fluid Mechanics	3	
		BNJ 20403	Control Engineering & Instrumentation	3	
		BNL 20102	Fundamentals to Plant Engineering	2	
		BNJ 20502	Electrical Power and Machine	2	
		BNJ 20302	Mechanics of Machine	2	
	III	BNJ 27101	Engineering Laboratory IV	1	6
BNL 20203		Plant Engineering Design	3		
3	I	BNJ 20602	Management and Professional Ethics	2	6
		BNJ 28001	Mechanical Engineering Practice II	1	
		BDJ 20303	Plant Fabrication Technology	3	
		BNJ 30403	Industrial Engineering and Quality Management	3	
		BNJ 37001	Engineering Laboratory V	1	
		BNJ 30203	Mechanical Engineering Design	3	
		BNJ 30302	Electrical Technology & Micro Processing	2	
		BNJ 30102	Vibration	2	
	II	BNL 30103	Thermodynamics Processes	3	12
		BNL 30201	Plant Engineering Technology Practice I	1	
4	I	BNL 30303	Piping Engineering	3	15
		BNJ 49003	Bachelor Degree Project I	3	
		BNL 40101	Plant Engineering Technology Practice II	1	
		BNL 40202	Instrumentation & Process Control	2	
		BNL 40303	Pressure Vessel Design	3	
		BNL 40403	Heat Transfer	3	
BNL 40503	Process Technology I	3			

	II	BNJ 49105	Bachelor Degree Project II	5	14
		BNL 40603	Process Technology II	3	
		BNL 40703	Plant Energy Efficiency	3	
		BNL 40803	Process Safety	3	
Overall Total Credit					140

Table 4.1. The content of OSH syllabus.

Chapter	Content
1	HEALTH, SAFETY AND ENVIRONMENT MANAGEMENT 1.1 Introduction to OSH 1.2 OSHA 1994 (Act 514) 1.3 FMA 1967 1.4 EQA 1974 1.5 Occupational Safety and Health Management System 1.6 Safety, Health and Environment Culture
2	RISK MANAGEMENT AND ASSESSMENT 2.1 Introduction to Risk Management 2.2 Risk Assessment Techniques 2.3 HIRARC
3	PHYSICAL INJURY AND CONTROLS 3.1 Introduction to Physical Injury 3.2 Construction Work 3.3 Electrical Work 3.4 Mechanical Work 3.5 Chemical Work
4	HEALTH HAZARDS 4.1 Introduction to Health Hazards & Hygiene 4.2 Chemical Hazards 4.3 Physical Hazards 4.4 Biological Hazards 4.5 Hygiene
5	ACCIDENT INVESTIGATION AND REPORTING 5.1 Introduction 5.2 Accident Investigation 5.3 Investigations and Causes of Incident 5.4 Incident Analysis and Data Collection Method