

Subject Guide – Introduction to vehicle safety

Shortened Name	VS	Semester	1-2023
Class Time (weekly)	Mon, 9-12	Lecture hours	3h x 15w
Subject Code	090125114	Assignment and self-study	5h x 15w
ECTS credits	6	Preparation for exam	30
KMUTNB Credits	3(3-0-6)	Total working hours/semester	150

1 Revision date of this document, reasons for revision

- 30.6.2023 (rubric addition and adjust content)

2 Course description

Active safety for accident prevention; Passive safety for crashworthiness; Accident survey and statistics; Dummy technology; Injury mechanism and criteria; Occupant protection systems for seat, steering, belt and air bag.

3 Lecturer/Teaching Assistant

- Assoc. Prof. Dr. Saiprasit Koetniyom & Mr. Manus Dangchart (Research Assistant)

4 Expected learning outcomes (in accordance with the MAE program ELOs)

Definition: Course Learning Outcomes (CLOs)

CLO1.- To recognize fundamentals of vehicle safety from the survey of road accident to prevention and active / passive safety in vehicle

CLO2.- To apply knowledge of dummy and injury mechanism with criteria for occupant protection systems

CLO3. - To analyse advanced research topics in the open literatures related to vehicle safety

GELO2 - Awareness of engineering responsibility (CLO1, CLO2)

GELO4 - Ability to work as team member (CLO1, CLO2)

GELO5 - Competence in literature research and summary (CLO3)

GELO6 - Presentation skills (CLO3)

GELO7 - Project management and team leadership skills (CLO1, CLO2)

SELO3 - Knowledge of technical systems and technologies in the field (CLO1, CLO2)

5 Assessment

Each student will be individually assessed based on the performance on coursework and paper exam, with the overall grade resulting from the shares as below:

Evaluated items	shares
Paper exam, 3 hours, on content of “ Sessions 1-4,6-7 ” of the class	40%
Paper exam, 3 hours, on content of “ Sessions 9,11-13 ” of the class	30%
Assignment, presentation, content of literature review and discussion	30%
Total	100%

6 Teaching materials

- Power-point presentations for lectures, handed over as reference and learning material
- E-books are provided by email before the first day of the class

7 Books and references

- 1) *Kinematics of Trauma*, <https://studyres.com/doc/1561681/chapter-4-kinematics-of-trauma>
- 2) Saiprasit Koetniyom, Julaluk Carmai, Khairil Anwar Ahmad Kassim, Yahaya Ahmad, "Kinematics and Injury Analysis of Front and Rear Child Pillion Passenger in Motorcycle Crash", *International Journal of Automotive and Mechanical Engineering (IJAME)*, Vol 15 No 3, 2018
- 3) Saiprasit Koetniyom, Kritapat Makarabhirom, and Julaluk Carmai, "Risk of rear occupant injuries under seat configuration in extended cab pickup truck: Actual left offset-frontal collision in Thailand (Accepted on 5 April 2017)," *Songklanakarin Journal of Science and Technology*, 40 (3), 588-594, May - Jun. 2018
- 4) Saiprasit Koetniyom, Saharat Chanthanumataporn, Manus Dangchat, Setthaluth Pangkreung, Chadchai Srisurangkul (2019). Technical Effectiveness of ABS, Non-ABS and CBS in Step-through Motorcycles. *Applied Science and Engineering Progress*. 10.14416/j.asep.2019.11.002.

8 Course schedule

Week	Start of Month	Activity, Class Title	Evaluation %	Class Hours
1	01	<u>Overview of automotive safety</u> - Understand automotive design and regulation related to accident data and human being (4% GELO2) - Understand all stakeholders and topics related to road traffic accident (4% GELO2) - Understand automotive industries for supply-chain and production 2% GELO2)	10%	3
2	01	<u>Active safety for accident prevention</u> - Understand concept of active safety (3% SELO3) - Understand the time, system& component and driver dependence related to active safety (3% SELO3)	6%	3
3-4	01	<u>Pre-crash and Passive safety for crash worthiness</u> - Understand concept of pre-crash (3% SELO3) - Understand concept of passive safety for human protection during the accident (3% SELO3) - Identify vehicle information to mitigate the occupant injury (3% SELO3)	9%	6
5	02	<u>Student Research discussion</u> - Perform literature survey for research proposal for examples <ul style="list-style-type: none"> • VRU Mitigation • Vehicle design for active safety • Vehicle design for passive safety • Accessary parts for occupants and VRU 	-	3
6	02	<u>Accident survey and statistics</u> - Understand the list information and tools for collecting accident data (2% SELO3)	6%	3

		<ul style="list-style-type: none"> - Understand the purposes of collecting parameters in accident data (2% SELO3) - Classify the pro and con of the national and international data for traffic accident (2% SELO3) 		
7	02	<u>Basic theories on vehicle collision and vehicle field tests</u> <ul style="list-style-type: none"> - Understand theories related to accident (6% SELO3) - Understand the purpose of vehicle field test (3% SELO3) 	9%	3
8	02	<u>Mid-term exam (40%)</u>	-	3
9	03	<u>Injury mechanism Kinematics</u> <ul style="list-style-type: none"> - Identify injury pattern from passenger car, bus truck and motorcycle (8% SELO3) - injury patterns based on impact direction (2% SELO3) - Analyze injury pattern from VRU (2% SELO3) 	12%	3
10	03	<u>Student Research discussion</u> <ul style="list-style-type: none"> - Perform research survey related to injury mechanism of vehicle - Utilize the content of research 	-	3
11	03	<u>Occupant protection systems</u> <ul style="list-style-type: none"> - Understand restraint system in vehicle (4% SELO3) - Understand the purpose of seat belt design (2% SELO3) - Understand the purpose of different designs of child seat (2% SELO3) 	8%	3
12	03	<u>Research Related Occupant protection</u> <ul style="list-style-type: none"> - Perform research survey related to occupant protection - Utilize the content of research 	-	3
13	04	<u>Dummy Technology and field test education</u> <ul style="list-style-type: none"> - Understand the process to develop Anthropometric Testing Device (ATD) (5% SELO3) 	10%	3

		- Distinguish different types and measurement device of ATD (5% SELO3)		
14	04	<u>Student Research discussion</u> - Perform research survey related to dummy development. - Utilize the content of research	-	3
15	04	<u>Assignment presentation</u> - Literature (5% GELO5) - Identify objective (5% GELO5) - Methodology (5% GELO5) - Presentation (5% GELO6) - Management of individual and team (5% GELO4, 5% GELO7)	30%	3
16	04	<u>Final-term exam (30%)</u>	-	3

9 Details on the evaluation of Expected Learning Outcomes

		Midterm Exam	Final Exam	Assignment	Total
		40%	30%	30%	
GELO2	Awareness of engineering responsibility (CLO1, CLO2)	10%	-	-	10%
GELO4	Ability to work as team member (CLO1, CLO2)	-	-	5%	5%
GELO5	Competence in literature research and summary (CLO3)	-	-	15%	15%

GELO6	Presentation skills (CLO3)	-	-	5%	5%
GELO7	Project management and team leadership skills (CLO1, CLO2)	-	-	5%	5%
SELO3	Knowledge of technical systems and technologies in the field (CLO1, CLO2)	30%	30%	-	60%

10 Holistic Rubrics (score marking for each question)

Score for each question	Criteria
0%	- Not answer
25%	- Only refer less than 50% of correctly related equations, theories or research materials with correct explanation.
50%	- Refer more than 50% correctly related equations, theories or research materials with sufficient explanation.
75%	- Refer more than 50% correctly related equations, theories or materials with sufficient explanation. - Convey clear sentence or structures with correctly less than 50% understanding based on references to answer the questions
100%	- Refer more than 50% correctly related equations, theories or materials with sufficient explanation. - Convey clear sentences or structures with correctly more than 50% understanding based on references to answer the question. - Show academic suggestion and discussion based on references to answer the questions

11 Analytic Rubrics (score marking for assignment)

Content	Score and criteria				
	0%	25%	50%	75%	100%
Presentation & Objective & Methodology	No presentation files	- content structure of presentation - clear information and update situations	- content structure of presentation - clear information and update situations - clear relevant literature reviews - objective is introduced - show methodology	- content structure of presentation - clear information and update situations - clear relevant literature reviews - clear gap identification of literatures for objective - show methodology based on theories or research works	- content structure of presentation - clear information and update situations - clear relevant literature reviews - clear gap identification of literatures for objective - show methodology and research plan or activities based on theories and literatures
Literature review	No content of research works	- present how to allocate sub-task for individual member	- present how to allocate sub-task for individual member - clear structure of categories of	- present how to allocate sub-task for individual member - clear structure of categories of	- present how to allocate sub-task for individual member - clear structure of categories of

			research works	research works - clear and correct content of each research work from literature	research works - clear and correct content of each research work from literature - identify the gap of research works from literature - present discussion of research works from literature
Management of individual and team	No management of individual and team	- show pictures of team or individual meeting	- show pictures of team or individual meeting at least 2 times	- show pictures of team or individual meeting at least 2 times - show content and minutes of meeting - clear task and deadline for each member relevant to assignment	- show pictures of team or individual meeting at least 2 times - show content and minutes of meeting - clear task and deadline for each member relevant to assignment

					- show process of follow-up to delivery task in members and how to solve problem
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