PORTOFOLIO MATA KULIAH

	INSTITUT TEKNOLOGI SEPULUH NOPEMBER (ITS) **FAKULTAS TEKNOLOGI INDUSTRI DAN REKAYASA SISTEM** **DEPARTEMEN TEKNIK SISTEM DAN INDUSTRI**

Mata Kuliah (MK) ***Course Name***		**Kode** ***Code***	**RMK** **Course Group**	**Bobot (sks)** **Credits**	**Semester**	**Last Review**
Sustainable Manufacturing		TI184926	Manufacturing System	3	8 - Pilihan	22 August 2020
Pengesahan ***Otoritation***	**Koordinator MK** ***Course Coordinator***	**Ketua RMK** ***Course Group Coordinator***		**Kadep / Kaprodi** ***Head of Study Program***		
	Maria Anityasari	Putu Dana Karningsih		Nurhadi Siswanto		
Team Teaching						

Capaian Pembelajaran Lulusan (CPL) / *Program Learning Outcomes (PLO)*

Kode / *code*	Deskripsi CPL / *PLO description*
(1)	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
(2)	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
(3)	An ability to communicate effectively with a range of audiences
(4)	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
(5)	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
(6)	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
(7)	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

RENCANA PEMBELAJARAN SEMESTER (RPS) - *COURSE PLANNING*

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1. Deskripsi Mata Kuliah (*Course Description*)

This is an elective course for undergraduate students at the Department of Industrial Engineering ITS. This course is designed to provide students with an understanding of macro sustainability issues, concepts and scope of Sustainable Manufacturing (SM), strategies in SM, management approaches in SM, and tools commonly used in SM. Additionally, a case study on Zero Waste Stores will be explored thoroughly. In the current situation, there is no doubt that integrating sustainability into business process will enhance business's total performance and competitiveness. Skills developed and knowledge acquired from this course will prepare students to be environmentally conscious engineers who are sensitive to environmentally related problems and capable to solve those problems and enhance total performance of industries.

2. Tujuan Pembelajaran Mata Kuliah (TP) / *Course Learning Outcomes* (CLO)

Dengan berakhirnya kuliah, diharapkan mahasiswa :
By the end of this course, students will be able to

Kode	Uraian CPMK / *Description of CLO*
TP1	Students understand the reasons, the history, the concept, the principles, the international movements, the progress of regulations/laws related to sustainable development and sustainable manufacturing at international, regional, national, and local levels
TP2	Students are able to recognize and identify problems related to sustainability at macro and micro levels
TP3	Students are able to implement sustainability principles in business processes
TP4	Students are able to implement five pillars of Life Cycle Management (LCM) to solve problems with medium complexity
TP5	Students develop sensitivity and care to environmental related problems surround them
TP6	Students are able to communicate their ideas and thoughts verbally and in writing

3. CPL yang dibebankan kepada Mata Kuliah (Matriks CPL-TP / PLO-CLO Matrix)

Learning Outcomes	CPL Program Studi / *CLO Study Program*						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
TP1			***			**	**
TP2	**	**	***	**	***	**	***
TP3	**	**	***	**	***	**	***
TP4	**	**	***	**	***	**	***
TP5			**	**		**	**
TP6							**

Content Rating Legend	
*	General Awareness, and not part of grade
**	15-30 minutes discussion or lecture for the term, and may be included as part of grade
***	More than 30 minutes discussion plus significant exercises and/or assignments, and it is included as part of grade

4. Mata Kuliah Prasyarat / *Prerequisites*

- Industrial Ecology

5. Referensi / *References*

- Anityasari, M. (2009) An Integrated Assessment Model for Reuse Strategy: Technicl, Social, Environmental, and Economic Aspects, VDM Verlag
- Curran, M.A. (1996) Environmental Life-Cycle Assessment, McGraw-Hill
- Lewis, H., Gertsakis, J., Grant, T., Morelli, N., Sweatman, A. (2001) Design+ Environment, Greenleaf Publishing
- Dornfeld, D.A. (2013) Green Manufacturing, Springer
- Kementerian Perindustrian Republik Indonesia (2014), Industri Hijau (Green Industry)
- Selected international journals & articles (materials will be provided)

6. Jadwal Perkuliahan / *Learning Schedule*

Week	Topic	Learning Method						Learning Facility					
		B1	**B2**	**B3**	**B4**	**B5**	**B6**	**S1**	**S2**	**S3**	**S4**	**S5**	**S6**
1	Topics: – Course introduction – Learning strategy – Review on environmental problems – Global movement & regulations related to Sustainable Development (SD) – Macro sustainability issues – Sustainable Development Goals (SDGs) References: – Sustainable Development Goals (SDGs) – Doing More with Less (UNSW Book)	√	√		√		√	√	√	√	√		√
2	Topics: – Green Building – Green Fashion – Green Life – Style References: Green Building Code by Green Building Council Indonesia (GBCI)	√	√		√		√	√	√	√	√		√
3	Topics: – Lean and Green Manufacturing – Industri Hijau – PROPER – Produksi Bersih – Eco Action Program (EAP) – ISO 14001 – Responsible Production and Consumption References: – Paper on Lean & Green Manufacturing – Pedoman Industri Hijau Kemenperin Indonesi	√	√		√		√	√	√	√	√		√

Week	Topic	Learning Method						Learning Facility					
		B1	**B2**	**B3**	**B4**	**B5**	**B6**	**S1**	**S2**	**S3**	**S4**	**S5**	**S6**
	– PROPER – Eco Action Program (EAP) – ISO 14001												
4	Topics: – Sustainable Manufacturing Strategies – Life Cycle Management (LCM) – LCE (Design for X (DfX); Product & Service System (PSS)) – Life Cycle Costing (LCC) – Product Data Management (PDM) – Technical Support (TS) References: – An Integrated Assessment Model for Reuse Strategy – Selected final projects – Selected international journals	√	√					√	√			√	
5 – 7	Topics: Life Cycle Assessment (LCA) References: – LCA textbook – PPT presentation on LCA – Selected papers on LCA	√	√		√		√	√	√	√	√		√
8	Guest Lecture Series – SDGs, Guest Lecture Series – Recycling												
9 - 16	Case Study in CommTECH Online 2020 Combating plastic waste through Zero Waste Stores (ZWS): Does it work?	√	√	√	√	√	√	√	√	√	√		√

Note: "√" sign indicates the learning method and the learning facility needed to deliver the topic.

Remark:

Learning Method		Learning Facility	
B1	Lecture	S1	Book
B2	Discussion/Presentation	S2	Power point
B3	Practicum	S3	Study guide
B4	Exercises	S4	Video
B53	Written Test	S5	Prototype (Props)
B6	Individual Learning/Assignment	S6	Problem/Case Study

7. Assessment Method and Its Relationship with Course's Learning Outcomes

No.	Type of Evaluation	Weight (%)	Evaluated Learning Outcomes					
			TP1	TP2	TP3	TP4	TP5	TP6
1	My Sharing @social media – min 8 sharings	15%	√	√	√	√	√	√
2	In-Class Learning Activity	15%	√	√	√	√	√	√
4	Assignments	20%	√	√	√	√	√	√
4	Case Study: Zero Waste Stores	50%			√	√	√	√