

MASTER CURRICULUM OPERATIONAL HANDBOOK & SYSTEM MAPPING

Program Study:	Sarjana Manajemen Rekayasa (S1 Engineering Management)	Institution:	Institut Teknologi Del (IT Del)
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This operational handbook outlines the comprehensive 10-step institutional methodology deployed for the design, evaluation, data synchronization, institutional governance, and lifecycle maintenance of the Sarjana Manajemen Rekayasa (Bachelor of Engineering Management) curriculum at Institut Teknologi Del. It translates structural spreadsheets, institutional regulations, field questionnaires, and academic validations into an integrated academic blueprint.

Curriculum Leadership & Authorship

- **Main Director of Engineering Management:** Devis Wawan Saputra.
- **Solo Curriculum Writer:** Devis Wawan Saputra.
- **Scope of Contribution:** Devis Wawan Saputra is the standalone author and director responsible for executing the entire 10-step institutional framework. He led a team of lecturers in the Engineering Management Department and translated all expert panel data, industrial stakeholder fieldwork, alumni tracer feedback, and global benchmarking criteria into this definitive 144-credit academic blueprint. Every step from formatting the 8-semester sequence matrices to authoring the legal transition rules and organizing campus information system automation was directed, written, and presented to the senate by him.

STEP 1: EXPERT CONSULTATION & QUALITATIVE INTERVIEW OPERATIONS

Curriculum development begins with field consultations and qualitative interviews with domain experts. These experts include senior academic theorists in industrial systems engineering, institutional leaders within the Indonesian Engineering Management Association, and organizational psychologists specializing in high-tech talent development.

Strategic Objectives & Methodology

- Identify structural shifts in global engineering paradigms, specifically focusing on the integration of Industry 4.0, Cyber-Physical Systems (CPS), and autonomous systems.
- Map essential cognitive taxonomies required for engineers to effectively transition from execution-oriented technical specialists to strategic managerial leaders.
- Validate the academic rigor of core knowledge fields against emerging national competencies and regional frameworks.

Expert Panels & Input Analysis

Consultations are conducted through semi-structured interviews and technical focus groups. Key strategic insights reveal that modern engineering managers must possess hybrid capabilities: solid foundational engineering literacies paired with advanced analytical-driven decision frameworks. Experts emphasized that standalone conceptual knowledge is insufficient; it must be coupled with structural data literacy, predictive analytics, and socio-technical system modeling.

STEP 2: MARKET NEEDS ASSESSMENT & INDUSTRY STAKEHOLDER FIELDWORK

To ensure alignment with the modern industrial landscape, field investigations were conducted across major multinational and national corporations within manufacturing, fast-moving consumer goods (FMCG), logistics, and information technology sectors.

Corporate Survey Mapping

Industry Sector	Target Organizations Evaluated	Core Competency Deficiencies Identified	Curricular Action Taken
Automotive & Manufacturing	PT Astra Otoparts, PT Astra Honda Motor	Advanced quality control engineering, automated process flows, and real-time plant diagnostics.	Enhanced Rekayasa Mutu (Quality Engineering) and structured operations planning.
FMCG & Supply Chain	PT Unilever Indonesia, PT Orang Tua (OT) Group	End-to-end supply chain visibility, predictive warehousing, and multi-modal freight optimization.	Integrated quantitative logistics modeling within Rekayasa Logistik.
Technology & Digital Services	PT Metrodata Electronics, Deliveroo Logistics	Data warehouse structures, database systems architecture, and scripting capability.	Deepened Basis Data and Dasar Programming from introductory to applied tracks.

STEP 3: GRADUATE TRACER STUDIES & ALUMNI FEEDBACK SYSTEMS

Alumni tracking acts as an empirical loop to assess the performance of the initial curriculum. Data gathered from the 2014 founding cohort through exit surveys and employer appraisals provides localized evidence regarding competency utilization.

Tracer Study Metrics (Founding Cohort Analysis)

An evaluation of 29 pioneering graduates tracked operational placement across distinct business domains. The quantitative outcomes demonstrated immediate absorption into highly technical managerial paths, highlighting the practical value of the degree:

Graduate Professional Designation	Core Functional Domain	Key Curricular Dependencies Highlighted	Alumni Recommendations
Business Analyst	Corporate Strategy / Tech	System Thinking, Perancangan Model Bisnis	Increase modeling with Microsoft Excel and data mining suites.
Supply Chain Supervisor	Logistics / Operations	PPIC, Penelitian Operasional, Simulasi	Incorporate Six Big Losses (SBL) and Overall Equipment Effectiveness (OEE).
Project Management Staff	Infrastructure / Engineering	Manajemen Proyek, Pembiayaan Proyek	Introduce agile methodologies alongside traditional PMBOK frameworks.

Critical Feedback Integration: Alumni data strongly indicated that early introductory courses were overly theoretical. The revised curriculum addresses this by embedding hands-on laboratory modules into technical tracks, ensuring students apply concepts directly.

STEP 4: GLOBAL BENCHMARKING & ACCREDITATION STANDARDS ALIGNMENT

To achieve national excellence and global relevance, the curriculum design maps its outcomes directly against premier international standards, notably the American Society for Engineering Management (ASEM) Graduate Guidelines and the ABET Engineering Accreditation Commission criteria.

International Curricular Matrix Mapping

Curriculum Classification Domain	Core Curricular Focus Areas	IT Del Focus Allocation	US Top Programs (Benchmarked)
Basic Sciences & Mathematics	Calculus, General Physics, Chemistry, Inferential Statistics	23% Credits	20% – 25% Credits
Core Engineering Specialization	Thermodynamics, Engineering Design, Technical Drawing, Coding	35% Credits	30% – 35% Credits
Management & Financial Integration	Engineering Economy, Project Finance, Business Model Design	25% Credits	20% – 30% Credits
Applied Capstone & Professional Practice	Integrated Capstone Project, Internships, Professional Ethics	17% Credits	15% – 20% Credits

STEP 5: SWOT ANALYSIS & CURRICULAR EVALUATION ITERATIONS

The curriculum development team performed several internal evaluation cycles, culminating in an institutional SWOT analysis designed to isolate structural gaps between older curriculum iterations and the target framework.

Curricular SWOT Matrix

Strengths (Internal Factors)	Weaknesses (Internal Factors)
- Strong baseline in foundational engineering sciences (Math, Physics, Chemistry). - Clear institutional identity tied to IT Del's 3M character principles.	- Introductory software and database courses lacked depth, creating gaps in technical execution. - Insufficient industrial tool application within theoretical management classes.
Opportunities (External Factors)	Threats (External Factors)
- Accelerated market demand for data-literate automation supervisors. - National regulatory shifts (KKNI Framework) encouraging flexible professional outcomes.	- Rapid technological shifts outpacing traditional, multi-year textbook update cycles. - Varying levels of regional industry readiness for highly advanced systems optimization.

STEP 6: COMPLIANCE WITH EXECUTIVE REGULATIONS & RECTORATE DIRECTIVES

Curriculum engineering must operate within institutional legal boundaries. The development process is explicitly guided by the higher-education directives issued by the office of the Rector.

Regulatory Framework Compliance

The blueprint complies with SK Rektor No. 132/ITDel/Rek/SK/X/18, which mandates a transition toward student-centered learning (SCL) methods. It implements active inquiry, case-based learning, and structured team projects to shift away from passive lecturing models. Furthermore, it incorporates the cognitive depth scales defined by the SOLO taxonomy and Bloom's Revised Framework, ensuring an orderly progression from lower-level introductory concepts to higher-level creative engineering design.

STEP 7: SYNTHESIS, STRUCTURAL CREATION, & CREDIT LOAD BALANCING

This step forms the operational core of the handbook. It synthesizes all external inputs, market requests, and regulatory guidelines into a definitive 144-credit academic sequence distributed over a 4-year, 8-semester standard path.

Knowledge Block (Bahan Kajian) Architecture

1. BK1 – Literacy in Science and Basic Engineering: Establishes basic scientific competencies. Includes Physics, Mechanics, Chemistry, and Technical Drawing.
2. BK2 – Mathematical Modeling & Quantitative Analytics: Builds advanced mathematical competencies. Focuses on Calculus, Probability Matrix Foundations, and Inferential Statistics.
3. BK3 – Socio-Technical Systems Thinking & Design: Focuses on identifying and structuring complex operational problems through qualitative and quantitative systems thinking.
4. BK4 – Technical Functional Management: Covers operational design, including engineering economics, process routing, work measurement, and facility planning.
5. BK5 – Quality Operations & Continuous Improvement: Teaches statistical process controls, total quality management frameworks, and international certifications (ISO).
6. BK6 – Information Systems Architecture & Data Software: Integrates software development, database query modeling, and enterprise resource planning.
7. BK7 – Strategic Business Development & High-Tech Entrepreneurship: Builds business model canvas design, project financial engineering, and technology strategy competencies.
8. BK8 – Professional Ethics & Institutional Core Values: Focuses on the character development of Del principles, environmental impact tracking, and engineering code of ethics.

Definitive 8-Semester Curricular Sequence (144 Total Credits)

Year 1: Foundational Sciences & Engineering Literacy

Code	Course Title	Credits	Code	Course Title	Credits
MAS1101	Matematika Dasar I (Calculus I)	4	MAS1201	Matematika Dasar II (Calculus II)	4
FIS1101	Fisika Dasar I (General Physics I)	4	FIS1201	Fisika Dasar II (General Physics II)	4
MRS1102	Pengantar Manajemen Rekayasa	2	KIS1001	Kimia Dasar (General Chemistry)	4
IFS1101	Pengantar Teknologi Informasi	2	MRS1201	Pengantar Desain Rekayasa	2

MRS1101	Sains Teknologi & Seni di Masyarakat	2	KUS1001	Tata Tulis Karya Ilmiah	2
KUS1102	Bahasa Inggris I	2	KUS1201	Bahasa Inggris II	2
KUS1101	Pembentukan Karakter Del	2			
Total SKS		18	Total SKS		18

Year 2: Intermediate Analytics & Applied Technical Blocks

Code	Course Title	Credits	Code	Course Title	Credits
MRS2104	Termodinamika Teknik	4	MAS2203	Matematika Lanjut	3
MAS2001	Probabilitas dan Statistika	3	MAS2204	Statistika Inferensi	3
MRS2101	Ekonomika Teknik	3	MRS2201	Penelitian Operasional I (OR I)	3
MRS2102	Teknologi Produksi dan Energi	3	MRS2202	Berpikir Sistem (Systems Thinking)	2
MRS2103	Visualisasi dan Gambar Teknik	2	MRS2203	Perencanaan & Pengendalian Produksi	2
IFS2180	Pengantar Pemrograman	2	MRS2204	Praktikum Sistem Produksi	2
KUS2001	Bahasa Inggris III	2	BPS2281	Teknologi Proses & Produk Hayati	3
Total SKS		19	Total SKS		18

Year 3: Advanced Operations, Optimization & Strategic Modeling

Code	Course Title	Credits	Code	Course Title	Credits
MRS3101	Penelitian Operasional II	3	MRS3201	Pembiayaan Proyek (Project Finance)	3
MRS3102	Analisis Keputusan (Decision Analysis)	3	MRS3202	Manajemen Proyek Rekayasa	3
MRS3103	Akuntansi Biaya (Cost Accounting)	2	MRS3203	Kewirausahaan Berbasis Tek. Lanjut	3
MRS3104	Pemasaran Teknologi (Tech Marketing)	2	MRS3204	Rekayasa Logistik (Logistics Eng.)	3
MRS3105	Perancangan Proses Bisnis Org.	3	MRS3205	Praktikum Optimasi & Simulasi Bisnis	1
MRS3106	Pengembangan Produk (Product Design)	3	BPS3280	Analisis Dampak Lingkungan (AMDAL)	2
ISS3280	Pengenalan Sisfo dan Basisdata	3	KUS4101	Pancasila dan Kewarganegaraan	2
Total SKS		19	Total SKS		17

Year 4: Integrative Capstone Execution & Professional Practice

Code	Course Title	Credits	Code	Course Title	Credits
MRS4191	Desain Proyek Rekayasa (Capstone)	5	MRS4291	Tugas Akhir (Senior Thesis)	5
MRS4101	Kajian Kelayakan Bisnis	3	KUS4201	Agama dan Etika	2
MRS4102	Simulasi Sistem	3	MRS4201	Etika Profesional	2
MRS4103	Rekayasa Mutu (Quality Engineering)	2	MRS40XX	Technical Elective Course II	3
MRS4192	Kerja Praktek (Industrial Internship)	2	MRS40XX	Technical Elective Course III	3
MRS40XX	Technical Elective Course I	3			
Total SKS		18	Total SKS		15

STEP 8: SENATE PRESENTATIONS & PEER REVIEW GOVERNANCE

Following structural synthesis, the draft curriculum underwent peer review overseen by the Academic Senate of Institut Teknologi Del. This process ensures the program meets institutional quality standards and aligns with broader academic strategies.

Senate Evaluation Benchmarks

- Structural Redundancy Pruning: Eliminating overlapping topic matrices between intermediate courses to optimize credit allocation.
- Prerequisite Enforcements: Verifying that students cannot register for advanced courses without demonstrating adequate foundational knowledge. For instance, completing MAS2001 (Probability and Statistics) is strictly enforced as a prerequisite before registering for MAS2204 (Inferential Statistics) or MRS4103 (Quality Engineering).

STEP 9: TRANSITION RULES & EQUIVALENCE MAPPING MATRICES

To prevent academic delays for active cohorts during the implementation of the new curriculum, clear transition rules and precise course equivalency matrices were established.

Strategic Mapping & Structural Variations

The core of the transition framework lies in auditing structural variations between legacy course codes and current operational codes. This ensures that historical academic progress maps accurately onto the updated graduation requirements.

Historical Legacy Code	Legacy Course Designation	Target Equivalent Code	Target Equivalent Designation	Credit Alignment Status
FIS2101	Termodinamika	MRS2104	Termodinamika Teknik	Maintained at 4 Credits
MRS2103	Standarisasi dan Gambar Teknik	MRS2103	Visualisasi dan Gambar Teknik	Maintained at 2 Credits
BPS3280	Analisis Dampak Lingkungan	BPS3280	Analisis Dampak Lingkungan (AMDAL)	Maintained at 2 Credits
MRS3205	Praktikum Optimasi dan Simulasi	MRS3205	Praktikum Optimasi & Simulasi Bisnis	Maintained at 1 Credit
MRS4190	Desain Proyek Rekayasa (Capstone)	MRS4191	Desain Proyek Rekayasa (Capstone)	Maintained at 5 Credits

STEP 10: SOCIALIZATION OPERATIONS & STUDENT INFORMATION SYSTEMS INTEGRATION

The final phase covers the public deployment and system-wide integration of the approved curriculum framework.

Student Information System (CIS) Synchronization

To ensure transparency, all course structures, structural prerequisite links, and explicit credit rules are mapped directly into the IT Del Campus Information System (CIS). This automation prevents registration errors and enables real-time tracking of academic progress.

Socialization Forums & Academic Advising Guidelines

A structured communication strategy ensures that the entire university community is aligned with the new framework:

- Student Open Forums: Targeted presentation sessions, with a particular focus on rising third- and fourth-year students, explaining equivalency tracks and transition choices.
- Bilingual Diploma Supplements (SKPI): The curriculum is mapped directly to the official Indonesian Surat Keterangan Pendamping Ijazah (SKPI). This provides graduates with a certified, bilingual breakdown of their competencies, ensuring their skills are clearly communicated to international employers and accreditation boards.