SAMPOERNA UNIVERSITY

INDUSTRIAL ENGINEERING DEGREE PLAN

YEAR 1, SEMESTER 1		
CODES	**COURSE TITLE**	**UNITS**
GMAT 1504	Calculus & Analytical Geometry I	5
GCHM 1301	General Chemistry I	3
GCHM 1101	General Chemistry I Lab	1
GENG 1301	Composition I	3
GNGR 1301	Introduction to Engineering	3
	General Education	3
Total		18

YEAR 1, SEMESTER 2		
CODES	**COURSE TITLE**	**UNITS**
GMAT 2505	Calculus & Analytical Geometry II	5
GCHM 2302	General Chemistry II	3
GCHM 2102	General Chemistry II Lab	1
ENGR 1302	Introduction to Computer Programming	3
GENG 1302	Composition II	3
GPHY 1401	General Physics with Calculus I	4
GPHY 1101	General Physics with Calculus I Lab	1
Total		20

YEAR 2, SEMESTER 3		
CODES	**COURSE TITLE**	**UNITS**
IENG 2301	Introduction to Industrial Engineering	3
GMAT 2506	Calculus & Analytical Geometry III	5
GPHY 2402	General Physics with Calculus II	4
GPHY 2102	General Physics with Calculus II Lab	1
IENG 2302	Object-Oriented Programming	3
SPC 1608	Introduction to Public Speaking	3
Total		19

YEAR 2, SEMESTER 4		
CODES	**COURSE TITLE**	**UNITS**
IENG 2303	Engineering Economics	3
IENG 2304	Numerical Methods	3
IENG 2105	Industrial Engineering Colloquium	1
ENGR 2302	Statics	3
ENC 2210	Professional & Technical Writing	3
GREL 1301	World Religion	3
	General Education	3
Total		19

YEAR 3, SEMESTER 5		
CODES	**COURSE TITLE**	**UNITS**
IENG 3301	Engineering Statistics	3
IENG 3302	Operations Research	3
IENG 3303	Software for Engineers	3
IENG 3304	Human Factors Engineering	3
	Technical Elective	3
GHUM 1302	Indonesian Language	3
Total		18

YEAR 3, SEMESTER 6		
CODES	**COURSE TITLE**	**UNITS**
IENG 3305	Stochastic Optimization	3
IENG 3306	Manufacturing Processes and Methods	3
IENG 3407	Information Systems Engineering	4
IENG 3308	Advanced Engineering Statistics	3
IENG 3309	Quality Control & Six Sigma	3
IENG 3399	Internship	3
Total		19

YEAR 4, SEMESTER 7		
CODES	**COURSE TITLE**	**UNITS**
IENG 4301	Indstrial Systems Simulation	3
IENG 4398	Senior Capstone I	3
IENG 4302	Supply Chain Management I	3
IENG 4303	Project Management	3
	General Education	3
GHUM 1301	Pancasila/Civic	3
Total		18

YEAR 4, SEMESTER 8		
CODES	**COURSE TITLE**	**UNITS**
IENG 4399	Senior Capstone II	3
IENG 4304	Supply Chain Management II	3
IENG 4305	Technopreneurship	3
	Technical Elective	3
	Social Science Requirement	3
	General Education	3
Total		18

Total Credit Hours for Industrial Engineering: 149 hours.

Course Descriptions:

The brief course descriptions below are for Industrial Engineering (IE) core curriculum only. For General Education courses, please refer to SUAC course descriptions.

1st SEMESTER

GMAT 1504 – Calculus & Analytical Geometry I (5 Credit Hours)

Introduction to calculus with an emphasis on understanding and problem solving. Concepts are presented graphically and numerically as well as algebraically. Elementary functions, their properties and uses in modeling; the key concepts of derivative and definite integral; techniques of differentiation, using the derivative to understand the behavior of functions; applications to optimization problems in physics, biology and economics. A graphing calculator is required for this course. We recommend the TI-83 or TI-84 models. Calculators that perform symbolic manipulations, such as the TI-89, NSpire CAS, or HP50g, cannot be used. Except as per University policy on repeating a course, credit will not be given for this course if the student has credit in a higher level math course. Such students may be dropped from the course. Examinations are proctored. Prerequisite(s): Math Placement.

GCHM 1301 + GCHM 1101 – General Chemistry I + Lab (3 + 1 Credit Hours)

Integrated lecture-lab course designed to develop a basic understanding of the central principles of chemistry that are useful to explain and predict the properties of chemical substances based on their atomic and molecular structure. Additionally, students will be introduced to modern laboratory techniques and participate in experimental activities that promote the development of basic and advanced science-process skills. The course is designed for students who require a strong foundation in general chemistry, such as science and engineering majors, pre-medical and pre-pharmacy students. Prerequisite(s): none.

GENG 1301 – Composition I (3 Credit Hours)

Exposition, emphasis on essays. Prerequisite(s): none.

GNGR 1301 – Introduction to Engineering (3 Credit Hours)

Engineering design, effective team participation and career preparation. Students are expected to participate in hands-on design projects, develop education/career plans and initiate development of the personal and management skills necessary for life long learning. Prerequisite(s): Concurrent enrollment or completion of GMAT 1504.

General Education (3 Credit Hours)

2nd SEMESTER

GMAT 2505 – Calculus & Analytical Geometry II (5 Credit Hours)

Continuation of GMAT 1504. Techniques of symbolic and numerical integration, applications of the definite integral to geometry, physics, economics, and probability; differential equations from a numerical, graphical, and algebraic point of view; modeling using differential equations, approximations by Taylor series. A graphing calculator is required for this course. We recommend the TI-83 or TI-84 models. Calculators that perform symbolic manipulations, such as the TI-89, NSpire CAS, or HP50g, cannot be used. Examinations are proctored. Prerequisite(s): GMAT 1504.

GCHM 2302 + GCHM 2102 – General Chemistry II + Lab (3 + 1 Credit Hours)
Continuation of CHM 1045 + L. Integrated lecture-lab course designed to develop a basic understanding of the central principles of chemistry that are useful to explain and predict the properties of chemical substances based on their atomic and molecular structure. Additionally, students will be introduced to modern laboratory techniques and participate in experimental activities that promote the development of basic and advanced science-process skills. The course is designed for students who require a strong foundation in general chemistry, such as science and engineering majors, pre-medical and pre-pharmacy students. Prerequisite(s): GCHM 1301 + GCHM 1101.

ENGR 1302 – Introduction to Computer Programming (3 Credit Hours)
Fundamentals of C, complexity and efficiency analysis, numerical precision and representations, intro to data structures, structured program design, application to solving engineering problems. Prerequisite(s): Concurrent enrollment or completion of GMAT 1504.

GENG 1302 –Composition II (3 Credit Hours)
Critical papers on selected subjects. Prerequisite(s): GENG 1301.

GPHY 1401 + GPHY 1101 – General Physics with Calculus I + Lab (4 + 1 Credit Hours)
A first course in Newtonian mechanics; introduces freshman-level students to the statics and dynamics of point particles, rigid bodies, and fluids. Topics include vector algebra, projectile and circular motion, Newton's Laws, conservation of energy, collisions and conservation of momentum, rotational dynamics and conservation of angular momentum, statics, harmonic oscillators and pendulums, gravitation and Kepler's Laws, fluid statics and dynamics. Prerequisite(s): GMAT 1504 & concurrent enrollment or completion of GMAT 2505.

3rd SEMESTER

IENG 2301 – Introduction to Industrial Engineering (3 Credit Hours)
System modeling; the elementary constructs and principles of system models including discrete time, discrete-state system theory; finite state machines; modeling components, system coupling, modes, homomorphisms and system experiments (simulation). System design including: requirements, life-cycle, performance measures and cost measures, tradeoffs, alternative design concepts, testing plan, and documentation. Applications and case studies from engineering. Prerequisite(s): ENGR 1301 & MAC 2312.

GMAT 2506 – Calculus & Analytical Geometry III (5 Credit Hours)

Vectors, differential and integral calculus of several variables. Examinations are proctored. Prerequisite(s): GMAT 2505 with C or better.

GPHY 2402 + GPHY 2102 – General Physics with Calculus II + Lab (4 + 1 Credit Hours)
A first course in electromagnetic fields and their applications. Coulomb's and Gauss' Law, electric fields and potentials, electrical and magnetic properties of matter, Ampere's and Faraday's laws, elementary DC and AC circuits, Maxwell's equations. Prerequisite(s): GPHY 1401 + GPHY 1101 & GMAT 2505.

IENG 2302 – Object-Oriented Programming (3 Credit Hours)
System modeling; the elementary constructs and principles of system models including discrete time, discrete-state system theory; finite state machines; modeling components, system coupling, modes, homomorphisms and system experiments (simulation). System design including: requirements, life-cycle, performance measures and cost measures, tradeoffs, alternative design concepts, testing plan, and documentation. Applications and case studies from engineering. Prerequisite(s): ENGR 1302.

SPC 1608 – Introduction to Public Speaking (3 Credit Hours)
This course is designed to provide students with fundamental training and practical experience for speaking in public, business, and professional situations. Topics include: audience analysis, speech anxiety, critical listening, and preparation and delivery of speeches in various cultural contexts. Students will also learn to effectively incorporate audio and visual aids/technologies for effective speeches. This is an International/Intercultural competency course. Prerequisite(s): GENG 1302.

4th SEMESTER

IENG 2303 – Engineering Economics (3 Credit Hours)
Methods and modern techniques of engineering management analysis for financial decision making. Development of income, cash flow, and balance sheet statements. Topics include time value of money, valuation techniques, replacement analysis, and project acceptance criteria. Prerequisite(s): GNGR 1301 & GMAT 2505.

IENG 2304 – Numerical Methods (3 Credit Hours)
Basics of data structures, transformations, computer methods, their implementation in MATLAB, and their applications in solving engineering problems. Prerequisite(s): ENGR 1302, GMAT 2505 & GPHY 1401 + GPHY 1101.

IENG 2105 –Industrial Engineering Colloquium (1 Credit Hour)
A colloquium designed to help students understand career opportunities for Industrial Engineering professionals. Students will interact with speakers and work environments, and explore various roles of Industrial Engineers in solving real engineering problems. The course helps students select course options within the degree program and helps focus on possible application areas. Prerequisite(s): IENG 2301.

ENGR 2302 – Statics (3 Credit Hours)

Equilibrium of a particle, equivalent and resultant force systems, equilibrium, geometric properties of areas and solids, trusses, frames and machines, shear force and bending moments, friction. Honors section is available. Prerequisite(s): GPHY 1401 + GPHY 1101 & GMAT 2505.

ENC 2210 – Professional & Technical Writing (3 Credit Hours)
Analysis and presentation of scientific and technical information. Prerequisite(s): GENG 1302.

GREL 1301 – World Religions (3 Credit Hours)

General Education (3 Credit Hours)

5th SEMESTER

IENG 3301 –Engineering Statistics (3 Credit Hours)
Axioms of probability, discrete and continuous distributions, sampling distributions. Engineering applications of statistical estimation, hypothesis testing, confidence intervals. Prerequisite(s): GMAT 2506.

IENG 3302 –Operations Research (3 Credit Hours)
Linear programming models, solution techniques, sensitivity analysis and duality. The objective of is the development of a working knowledge of deterministic operations research techniques, primarily linear programming; logistics network and flow problems: transportation problems, shortest path and vehicle routing problems, maximum flow problems; project and resource management, operations sequencing and resource scheduling. Prerequisite(s): IENG 2304 & IENG 2305.

IENG 3303 – Human Factors Engineering (3 Credit Hours)
Consideration of human characteristics in the requirements for design of systems, organizations, facilities and products to enable human-centered design, which considers human abilities, limitations and acceptance. Prerequisite(s): GMAT 2506.

IENG 3304 – Software for Engineers (3 Credit Hours)
Rapid prototyping of decision support systems using Visual Basic for Applications (VBA) and Excel. Use of VBA, Excel, and external packages to solve optimization problems, to perform simulations, and to perform forecasting. Rapid design and implementation of decision support systems for financial, supply chain, and facility location problems. Python tools with VBA and Excel are introduced for code minimization and maintainability. Prerequisite(s): ENGR 1302.

Technical Elective (3 Credit Hours)
See major advisor for course approval.

GHUM 1302 – Indonesian Language (3 Credit Hours)

6th SEMESTER

IENG 3305 – Stochastic Optimization (3 Credit Hours)

The course covers fundamental probabilistic models and applications of operations research, which describe industrial systems and processes involving uncertain or random information or data. Prerequisite(s): IENG 3301.

IENG 3306 – Advanced Engineering Statistics (3 Credit Hours)
Design and analysis of experiments employing numerical and graphical methods. Topics include control charts, probability plots, multiple regression analysis, confidence and prediction intervals and significance tests. Prerequisite(s): IENG 3301.

IENG 3307 – Quality Control & Six Sigma (3 Credit Hours)
Quality, improvement and control methods with applications in design, development, manufacturing, delivery and service. Topics include modern quality management philosophies, engineering/statistical methods (including process control, control charts, process capability studies, loss functions, experimentation for improvement) and TQM topics (customer driven quality, teaming, Malcolm Baldrige and ISO 9000). Prerequisite(s): IENG 3301.

IENG 3308 –Manufacturing Processes & Methods (3 Credit Hours)
Introduces basic primary and secondary manufacturing processes as well as integration of part design and manufacturing. Students are exposed to the concepts and usage of tools for manufacturing. Prerequisite(s): GNGR 1301, GPHY 1401 + GPHY 1101 & ENGR 1302.

IENG 3309 – Embedded Computer Systems (4 Credit Hours)
This course introduces the concepts of boolean algebra, combinational and sequential logic circuits, finite state machines, simple computer architecture, assembly and C/C++ language programming and real-time computer control. Prerequisite(s): GNGR 1301 & ENGR 1302.

IENG 3399 – Internship (3 Credit Hours)

7th SEMESTER

IENG 4398 – Senior Capstone (3 Credit Hours)
A culminating experience for majors involving a substantive project that demonstrates a synthesis of learning accumulated in the major, including broadly comprehensive knowledge of the discipline and its methodologies. IENG 4398 and IENG 4399 must be taken in consecutive semesters. Prerequisite(s): senior standing.

IENG 4301 – Industrial Systems Simulation (3 Credit Hours)
This course is designed to develop student's ability to model and analyze real systems using discrete event simulation. Through this course, the student will understand the power and characteristics of discrete event simulation modeling. During the course, the student will get experience in: (1) formulating an appropriate simulation model for a system, (2) implementing the model as a computer program, and (3) evaluating the output of the model. Prerequisite(s): IENG 3301.

IENG 4302 – Supply Chain Management I (3 Credit Hours)

Production systems, quantitative methods for forecasting, aggregate planning, inventory control, materials requirement planning, production scheduling, manpower planning and facility design. Prerequisite(s): IENG 3301 & IENG 3302.

IENG 4303– Project Management (3 Credit Hours)
Foundations, principles, methods and tools for effective design and management of projects in technology-based organizations. This course focuses on the scope, time, cost, performance and quality concerns of engineering projects characterized by risk and uncertainty. Initiating, planning, executing, monitoring, controlling and closing process are addressed. Students design and complete a project from concept through completion. Project Management software is utilized. Prerequisite(s): Advanced Standing Engineering.

General Education (3 Credit Hours)

GHUM 1301 – Pancasila/Civic (3 Credit Hours)

8th SEMESTER

IENG 4399 – Senior Capstone (3 Credit Hours)
A culminating experience for majors involving a substantive project that demonstrates a synthesis of learning accumulated in the major, including broadly comprehensive knowledge of the discipline and its methodologies. IENG 4398 and IENG 4399 must be taken in consecutive semesters. Prerequisite(s): IENG 4398**.**

IENG 4304 – Supply Chain Management II (3 Credit Hours)
Fundamentals of Supply Chain Management including inventory/logistics planning and management, warehouse operations, procurement, sourcing, contracts and collaboration. Prerequisite(s): IENG 4302.

IENG 4305 – Technopreneurship (3 Credit Hours)
Description: Principles of the engineering sales process in technology-oriented enterprises; selling strategy, needs analysis, proposals, technical communications, electronic media, time management and ethics; practical application of concepts through study of real-world examples. Prerequisite(s): Advanced Standing Engineering.

Technical Elective (3 Credit Hours)
See major advisor for course approval.

Social Science Requirement (3 Credit Hours)

General Education (3 Credit Hours)