CIRP
Manufacturing Engineering Curriculum for Undergraduate Students

August 26, 2017

Background

- The Manufacturing Engineering Curriculum Committee (MEC) was formed on 8 September 2016, and is made up of the following members:

  (1) Fengzhou Fang (Chair)

  (2) Yusuf Altintas

  (3) Alain Bernard

  (4) Chris Evans

  (5) Tojiro Aoyama

  (6) Wei Gao

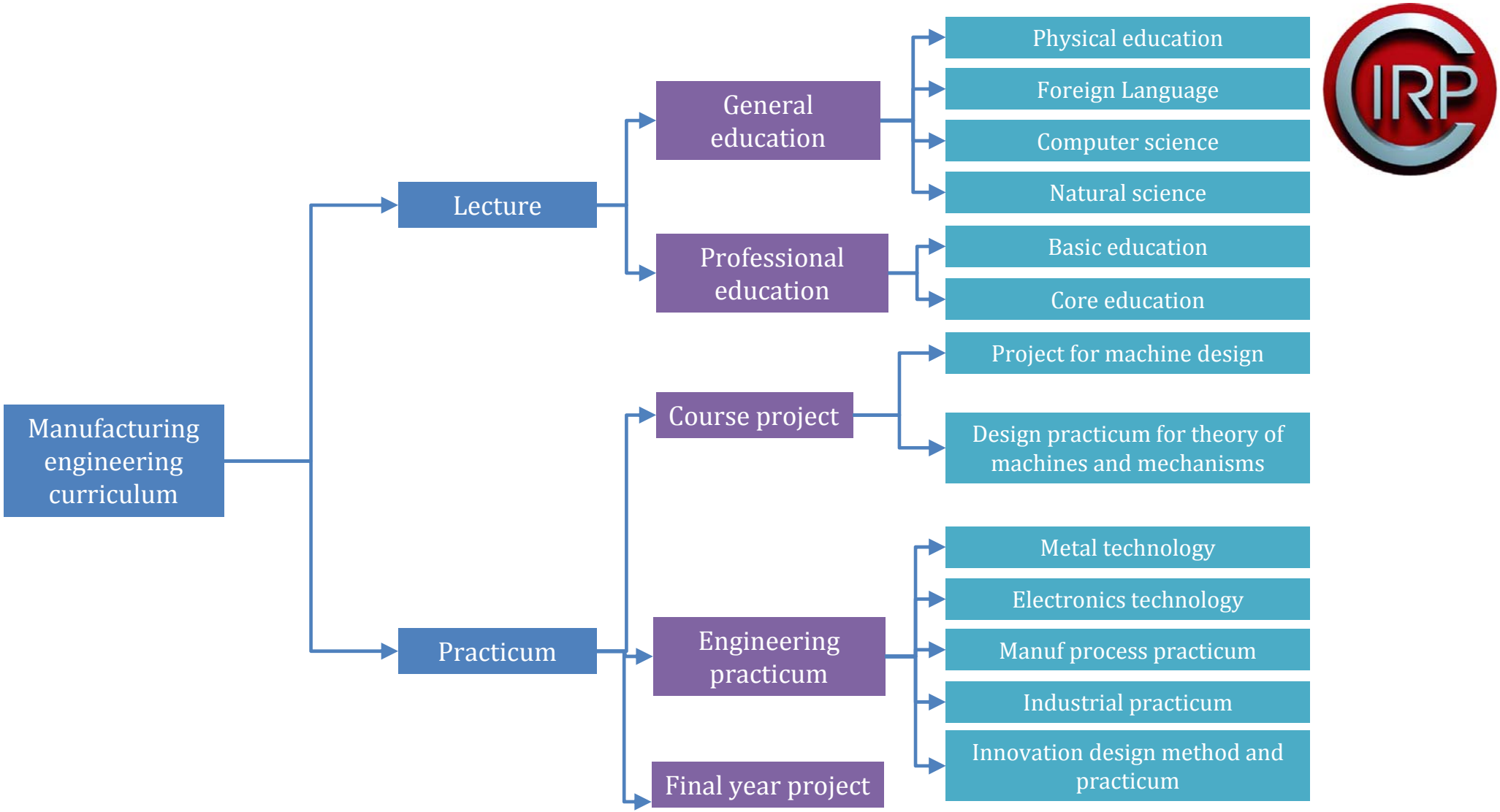
  (7) Srichand Hinduja

Mechanical Engineering Curriculum - Manufacturing Major

1. General education
   - General education
   - Physical education
   - Computer science
   - Natural science
   - Humanities electives
2. Professional basic education
   - Theoretical, Material and Fluid mechanics
   - Engineering materials
   - Thermodynamics
   - Electrical & electronics, Microcomputer principle and interface technology
   - Engineering/ Mechanical graphics and CAD fundamentals
   - Mechanism and machine theory, Machine design, Manufacturing technology, Automation control engineering, Manufacturing processes and engineering, Interchangeability & measurement technology, Fundamentals of mechanical engineering test technology

Mechanical Engineering Curriculum - Manufacturing Major

3. <u>Professional core education</u>
   - Manufacturing processes and automation
   - Mechatronics control and automation
   - Computer-aided design and manufacturing
   - Engineering machinery and logistics engineering
   - Machinery design
   - Manufacturing innovation, business and economics
4. <u>Engineering practicums</u>
   - Machine and mechanism design practicum
   - Mechanical principles practicum
   - Metal/electronics technology practicum
   - Mechanical engineering practicum
   - Engineering industrial practicum
   - Innovation design method and practicum


Manufacturing engineering curriculum
Lecture
Practicum
General education
Professional education
Course project
Engineering practicum
Final year project
Physical education
Foreign Language
Computer science
Natural science
Basic education
Core education
Project for machine design
Design practicum for theory of machines and mechanisms
Metal technology
Electronics technology
Manuf process practicum
Industrial practicum
Innovation design method and practicum

Education Goals

- To enable students to compete internationally in the areas of design, optimization, control and management of processes, machines and systems
- To develop solid specialized knowledge in mechanical design, manufacturing and automation
- To master the knowledge in manufacturing, mechanics, electronics, computer science, management and related areas
- To facilitate strong independent study capability, wide-range of knowledge, excellent communication skills, innovative mindset and broad international perspective
- To enable students to undertake various projects in scientific research, product design and manufacturing, and production management

Desired Outcomes

- Fundamental engineering knowledge
- Problem analysis
- Solution design and development
- Research
- Usage of modern research tools
- Sustainability
- Professional norms
- Team player
- Communication
- Project management
- Life-long learning

Manufacturing Engineering Curriculum for 4-Year Undergraduate Study

Manufacturing Engineering Curriculum – First Year

Course No	Title	Credit	Relation to cultivation requirements
INTR111	Introduction to Engineering I	3	1
INTR 112	Introduction to Engineering II	3	1
INTR 113	Introduction to Computation in Engineering Design	3	1
CHEM 114	Chemistry for Engineering	3	1, 8
ENGL 115	Strategies for University Writing	3	2
MATH 116	Differential Calculus with Applications to Physical Science and Engineering	3	1
MATH 121	Integral Calculus with Applications to Physical Science and Engineering	3	1
MATH 122	Linear Systems	3	1
PHYS 123	Introductory Physics for Engineers I	3	1, 8
PHYS 124	Introductory Physics for Engineers II	3	1, 8
PHYS 125	Introductory Physics Laboratory for Engineers	1	1, 8
PHYS 126	Mechanics I	3	1, 8
COMP127	C/C++/Java programming	3	5
ARTS 101	*Modern Arts	2	3,4,9,11
PHIL 102	*Introductory Philosophy	2	3,4,9,11
	SUM	39	

Manufacturing Engineering Curriculum – Second Year

Course No:	Title	Credit	Relation to cultivation requirements
MATH 212	Multivariable Calculus	3	1
MATH 213	Ordinary Differential Equations	3	1
STATS 214	Elementary statistics	3	1
MANU 211	Machine Design and Manufacturing Engineering Project 1 (includes boot camp)	4	2, 3, 4
MANU 215	Technical Communications	3	9
INTR 216	Engineering Materials I	4	1
MANU 221	Thermodynamics	3	1
MECH222	Fluid Mechanics	3	1
COMP 223	Microcomputer and interfacing technology	3	1
MECH224	Solid Mechanics	3	1
MANU 225	Electrotechnics & Electronics (including experiments)	3	1, 8
MANU 2278	Production Systems Management I	3	2, 3, 4, 10
MUSI 201	*Music appreciation	2	3,4,9,11
LITE 201	*Classic Literature	2	3,4,9,11
	SUM	40	

Manufacturing Engineering Curriculum – Third Year

Course No:	Title	Credit	Relation to cultivation requirements
MANU 311	Machine Design and Manufacturing Engineering Project 2	5	2, 3, 4
MANU 312	Machine Dynamics	3	2, 3, 4
MANU 313	Manufacturing Processes I	3	2, 3, 4
MANU 314	Engineering Materials II	3	1
MTRL 315	Heat Transfer	3	1
MECH 316	Mechanical Vibrations	3	1
MECH 321	Interchangeability and Engineering Measurements	4	2, 3, 4
COME 322	Computer Aided Manufacturing	3	2, 3, 4, 5
MANU 323	Industrial Automation: Robots, PLC, Embedded Systems	3	2, 3, 4
MANU 324	Machine and Part Metrology	3	2, 3, 4
MANU 326	Production Systems Management II	3	2, 3, 4,10
DESI 423	Product Design and Development	3	2, 3, 4
BLAW 301	*Basic Law	2	3,4,9,11
HIST 302	*Human Evolution History	2	3,4,9,11
	SUM	41	

Manufacturing Engineering Curriculum – Fourth Year

"Production Tech" Stream Curriculum

Course No:	Title	Credit	Relation to cultivation requirements
MANU 411	Design and Manufacturing Engineering Project 3	6	2, 3, 4
MANU 412	Manufacturing Processes II	3	2, 3, 4
MANU 413	Manufacturing Processes III (Coating, Joining, Additive manufacturing, Electro-chemical machining, Roll to roll etc.)	3	2, 3, 4
MANU 414	Finite Element Methods	3	1
MANU 415	Precision Engineering	3	2, 3, 4
MECH 416	Computer Control of Mechatronics Systems	4	2, 3, 4
MANU 417	Engineering Economics	3	3, 6, 10
PRAC 418	Professional Engineering Practice	3	2, 3, 4, 5
FYP 410	Final Year Project	6	1-11
	*Technical electives	6	
	SUM	40	

"Production Management" Stream Curriculum

Course No:	Title	Credit	Relation to cultivation requirements
MANU 411	Design and Manufacturing Engineering Project 3	6	2, 3, 4
PROM 421	Production Management III	3	5, 10, 11
LICY 422	Life Cycle Analysis and Sustainability	3	6, 10
ECON 424	Engineering Economy	3	6, 10
MECH 425	Capstone Design and Manufacturing Project	4	2, 3, 4
SUPP 426	Supply Chain Tactics & Strategies	3	6, 10
DEM 427	Digital Enterprise Management (DEM) and Manufacturing Strategies	3	2, 3, 4
PRAC 428	Professional Engineering Practice	3	2, 3, 4
FYP 420	Final Year Project	6	1-11
	*Technical electives	6	
	SUM	40	

Manufacturing Engineering Curriculum for 5-Year Undergraduate Study

Manufacturing Engineering Curriculum – First Year

Course No	Title	Credit	Relation to cultivation requirements
INTR111	Introduction to Engineering I	3	1
INTR 112	Introduction to Engineering II	3	1
INTR 113	Introduction to Computation in Engineering Design	3	1
CHEM 114	Chemistry for Engineering	3	1, 8
ENGL 115	Strategies for University Writing	3	2
MATH 116	Differential Calculus with Applications to Physical Science and Engineering	3	1
MATH 121	Integral Calculus with Applications to Physical Science and Engineering	3	1
MATH 122	Linear Systems	3	1
PHYS 123	Introductory Physics for Engineers I	3	1, 8
PHYS 124	Introductory Physics for Engineers II	3	1, 8
PHYS 125	Introductory Physics Laboratory for Engineers	1	1, 8
PHYS 126	Mechanics I	3	1, 8
COMP127	C/C++/Java programming	3	5
ARTS 101	*Modern Arts	2	3,4,9,11
PHIL 102	*Introductory Philosophy	2	3,4,9,11
	SUM	39	

Manufacturing Engineering Curriculum – Second Year

Course No:	Title	Credit	Relation to cultivation requirements
MATH 212	Multivariable Calculus	3	1
MATH 213	Ordinary Differential Equations	3	1
STATS 214	Elementary statistics	3	1
MANU 211	Machine Design and Manufacturing Engineering Project 1 (includes boot camp)	4	2, 3, 4
MANU 215	Technical Communications	3	9
INTR 216	Engineering Materials I	4	1
MANU 221	Thermodynamics	3	1
MECH222	Fluid Mechanics	3	1
COMP 223	Microcomputer and interfacing technology	3	1
MECH224	Solid Mechanics	3	1
MANU 225	Electrotechnics & Electronics (including experiments)	3	1, 8
MANU 2278	Production Systems Management I	3	2, 3, 4, 10
MUSI 201	*Music appreciation	2	3,4,9,11
LITE 201	*Classic Literature	2	3,4,9,11
	SUM	40	

Manufacturing Engineering Curriculum – Third Year

Course No:	Title	Credit	Relation to cultivation requirements
MANU 311	Machine Design and Manufacturing Engineering Project 2	5	2, 3, 4
MANU 312	Machine Dynamics	3	2, 3, 4
MANU 313	Manufacturing Processes I	3	2, 3, 4
MANU 314	Engineering Materials II	3	1
MTRL 315	Heat Transfer	3	1
MECH 316	Mechanical Vibrations	3	1
MECH 321	Interchangeability and Engineering Measurements	4	2, 3, 4
COME 322	Computer Aided Manufacturing	3	2, 3, 4, 5
MANU 323	Industrial Automation: Robots, PLC, Embedded Systems	3	2, 3, 4
MANU 324	Machine and Part Metrology	3	2, 3, 4
MANU 326	Production Systems Management II	3	2, 3, 4,10
DESI 423	Product Design and Development	3	2, 3, 4
BLAW 301	*Basic Law	2	3,4,9,11
HIST 302	*Human Evolution History	2	3,4,9,11
	SUM	41	

Manufacturing Engineering Curriculum – Fourth Year

"Production Tech" Stream Curriculum

Course No:	Title	Credit	Relation to cultivation requirements
MANU 411	Design and Manufacturing Engineering Project 3	6	2, 3, 4
MANU 412	Manufacturing Processes II	3	2, 3, 4
NACS501	Nanomanufacturing and ACSM	3	2, 3, 4
MANU 414	Finite Element Methods	3	1
MECH 416	Computer Control of Mechatronics Systems	4	2, 3, 4
MANU 417	Engineering Economics	3	3, 6, 10
PRAC 418	Professional Engineering Practice I	3	2, 3, 4, 5
MTRL 315	Heat Transfer	3	1
PHIL419	*Classic Philosophy	3	3,4,9,11
	SUM	31	

"Production Management" Stream Curriculum

Course No:	Title	Credit	Relation to cultivation requirements
MANU 411	Design and Manufacturing Engineering Project 3	6	2, 3, 4
PROM 421	Production Management III	3	5, 10, 11
NACS501	Nanomanufacturing and ACSM	3	6, 10
ECON 424	Engineering Economy	3	6, 10
MECH 425	Capstone Design and Manufacturing Project I	4	2, 3, 4
SUPP 426	Supply Chain Tactics & Strategies	3	6, 10
DEM 427	Digital Enterprise Management (DEM) and Manufacturing Strategies	3	2, 3, 4
PRAC 428	Professional Engineering Practice I	3	2, 3, 4
PHIL419	*Classic Philosophy	3	3,4,9,11
	SUM	31	

Manufacturing Engineering Curriculum – Fourth Year

"Production Tech" Stream Curriculum

Course No:	Title	Credit	Relation to cultivation requirements
MANU 411	Design and Manufacturing Engineering Project 4	6	2, 3, 4
MANU 412	Manufacturing Processes III (Coating, Joining, Additive manufacturing, Electro-chemical machining, Roll to roll etc.)	3	2, 3, 4
MANU 415	Precision Engineering	3	2, 3, 4
PRAC 418	Professional Engineering Practice II	6	2, 3, 4, 5
FYP 410	Final Year Project	8	1-11
	*Technical electives	6	
	SUM	35	

"Production Management" Stream Curriculum

Course No:	Title	Credit	Relation to cultivation requirements
MANU 411	Design and Manufacturing Engineering Project 4	6	2, 3, 4
LICY 422	Life Cycle Analysis and Sustainability	3	6, 10
MECH 425	Capstone Design and Manufacturing Project II	4	2, 3, 4
PRAC 428	Professional Engineering Practice II	6	2, 3, 4
FYP 420	Final Year Project	8	1-11
	*Technical electives	6	
	SUM	35	