GRADUATE STUDENTS
List of Core Modules and Elective Modules

(A)   For new students admitted in AY2020/2021
(B)   For existing students admitted in AY2019/2020

List of core modules and elective modules (*for new students admitted in AY2020/2021*)

Unit	Module Title	MCs	LAB	Subsidy status
Core Modules				
	IND5001 Introduction to Industry 4.0 and Applications	**4**	N	No subsidy
	IND5002 Digital-Physical Integration in Industry 4.0	**4**	N	No subsidy
	IND5003 Data Analytics for Sense-making	**4**	N	No subsidy
	IND5004 Digital Infrastructure and Transformation	**4**	N	No subsidy
	IND5005A Professional Career Development	**0.5**	N	No subsidy
	IND5005B Industry Consulting and Application Project	**3.5**	N	No subsidy
Elective Modules from Graduate Certificate Courses				
BIZ	**Digital Supply Chain**	**12**		
	IND5021 Managing the Digital Supply Chain	4	N	SSG subsidy
	IND5022 Data Analytics for Smart Manufacturing	4	N	SSG subsidy
	DSC5221A Managing the Financial Supply Chain	2	N	SSG subsidy
	IND5024 Strategic Procurement in a Digital World	2	N	SSG subsidy
FoE	**Additive Manufacturing** (Choose 6 modules)	**12**		
	ME5608A Principles and Processes of Additive Manufacturing	2	Y	SSG subsidy
	ME5608B Hybrid Manufacturing	2	Y	SSG subsidy
	ME5615A Design and Pre-processing for Additive Manufacturing	2	Y	SSG subsidy
	ME5615B Post-processing for Additive Manufacturing	2	Y	SSG subsidy
	ME5614A Special Project in Additive Manufacturing	2	Y	SSG subsidy
	ME5513A Fatigue Analysis for Additive Manufacturing	2	Y	SSG subsidy
	MLE5301 Metallic & Ceramic Materials in Additive Manufacturing	2	Y	SSG subsidy
	MLE5302 Polymer Materials in Additive Manufacturing	2	Y	SSG subsidy
	Internet of Things (Choose 5 modules)	**10**		
	EE5020 Data Science for Internet of Things	2	Y	SSG subsidy
	EE5021 Cloud Based Services for Internet of Things	2	Y	SSG subsidy
	EE5022 Cyber Security for Internet of Things	2	Y	SSG subsidy
	EE5023 Wireless Networks	2	Y	SSG subsidy
	EE5024 Sensor Networks	2	Y	SSG subsidy
	EE5025 Intellectual Property: Innovations in IoT	2	Y	SSG subsidy
	EE5026 Machine Learning for Data Analytics	2	Y	SSG subsidy
	EE5027 Statistical Pattern Recognition	2	Y	SSG subsidy
	EE5060 Sensors and Instrumentation for Automation	2	Y	SSG subsidy
	EE5061 Industrial Control and Programming	2	Y	SSG subsidy
FoS	**Data Mining and Interpretation**	**8**		
	ST5227 Applied Data Mining	4	N	SSG subsidy
	DSA5203 Visual Data Processing and Interpretation	4	N	SSG subsidy
	Deep Learning for Industry	**8**		
	DSA5102 Foundations of Machine Learning	4	N	SSG subsidy
	DSA5204 Deep Learning and Applications	4	N	SSG subsidy

Unit	Module Title	MCs	LAB	Subsidy status
FoS	**Quality Assurance and Yield Optimization** (Choose 2 modules)	**8**		
	ST5203 Design of Experiments for Product Design and Process Improvements	4	N	SSG subsidy
	ST5208 Analytics for Quality Control and Productivity Improvements	4	N	SSG subsidy
	ST5212 Survival Analysis	4	N	SSG subsidy
	ST5210 Multivariate Data Analysis	4	N	SSG subsidy
ISS	**ISY5002 Pattern Recognition Systems** • Problem Solving Using Pattern Recognition • Pattern Recognition and Machine Learning Systems • Intelligent Sensing and Sense Making • Practice Project	**13**	Y	Refer to ISS website
	ISY5004 Intelligent Sensing Systems • Vision Systems Engineering • Spatial Reasoning from Sensor Data • Real time audio-visual sensing and sense making • Practice Project	**10**	Y	Refer to ISS website
SoC	**Principles and Practice of Secure Systems** (Choose 3 modules)	**12**		
	CS5321 Network Security	4	Y	SSG subsidy
	CS5322 Database Security	4	Y	SSG subsidy
	CS5332 Biometric Authentication	4	Y	SSG subsidy
	CS5331 Web Security	4	Y	SSG subsidy
	CS5439 Software Security	4	Y	SSG subsidy
	Digital Business (Choose 3 modules)	**12**		
	IS5007 Strategising for Global IT-enabled Business Success	4	N	SSG subsidy
	IS5116 Digital Entrepreneurship	4	N	SSG subsidy
	IS5117 Digital Government	4	N	SSG subsidy
	IS5151 Information System Security Policy and Management	4	N	SSG subsidy

List of core modules and elective modules (*for existing students admitted in AY2019/2020*)

Unit	Module Title	MCs	LAB	Subsidy status
Core Modules				
	IND5001 Introduction to Industry 4.0 and Applications	**4**	N	No subsidy
	IND5002 Digital-Physical Integration in Industry 4.0	**4**	N	No subsidy
	IND5003 Data Analytics for Sense-making	**4**	N	No subsidy
	IND5004 Digital Infrastructure and Transformation	**4**	N	No subsidy
	IND5005 Industry Consulting and Application Project	**4**	N	No subsidy
Elective Modules from Graduate Certificate Courses				
FoE	**Additive Manufacturing** (Choose 6 modules)	**12**		
	ME5608A Principles and Processes of Additive Manufacturing	2	Y	SSG subsidy
	ME5608B Hybrid Manufacturing	2	Y	SSG subsidy
	ME5615A Design and Pre-processing for Additive Manufacturing	2	Y	SSG subsidy
	ME5615B Post-processing for Additive Manufacturing	2	Y	SSG subsidy
	ME5614A Special Project in Additive Manufacturing	2	Y	SSG subsidy
	ME5513A Fatigue Analysis for Additive Manufacturing	2	Y	SSG subsidy
	MLE5301 Metallic & Ceramic Materials in Additive Manufacturing	2	Y	SSG subsidy
	MLE5302 Polymer Materials in Additive Manufacturing	2	Y	SSG subsidy
	Internet of Things (Choose 5 modules)	**10**		
	EE5020 Data Science for Internet of Things	2	Y	SSG subsidy
	EE5021 Cloud Based Services for Internet of Things	2	Y	SSG subsidy
	EE5022 Cyber Security for Internet of Things	2	Y	SSG subsidy
	EE5023 Wireless Networks	2	Y	SSG subsidy
	EE5024 Sensor Networks	2	Y	SSG subsidy
	EE5025 Intellectual Property: Innovations in IoT	2	Y	SSG subsidy
	EE5026 Machine Learning for Data Analytics	2	Y	SSG subsidy
	EE5027 Statistical Pattern Recognition	2	Y	SSG subsidy
	EE5060 Sensors and Instrumentation for Automation	2	Y	SSG subsidy
	EE5061 Industrial Control and Programming	2	Y	SSG subsidy
FoS	**Data Mining and Interpretation**	**8**		
	ST5227 Applied Data Mining	4	N	SSG subsidy
	DSA5203 Visual Data Processing and Interpretation	4	N	SSG subsidy
	Deep Learning for Industry	**8**		
	DSA5102 Foundations of Machine Learning	4	N	SSG subsidy
	DSA5204 Deep Learning and Applications	4	N	SSG subsidy
	Quality Assurance and Yield Optimization	**8**		
	ST5203 Design of Experiments for Product Design and Process Improvements	4	N	SSG subsidy
	ST5208 Analytics for Quality Control and Productivity Improvements	4	N	SSG subsidy

Unit	Module Title	MCs	LAB	Subsidy status
ISS	**ISY5002 Pattern Recognition Systems** • Problem Solving Using Pattern Recognition • Pattern Recognition and Machine Learning Systems • Intelligent Sensing and Sense Making • Practice Project	13	Y	Refer to ISS website
	ISY5004 Intelligent Sensing Systems • Vision Systems Engineering • Spatial Reasoning from Sensor Data • Real time audio-visual sensing and sense making • Practice Project	10	Y	Refer to ISS website
SCALE	**Digital Supply Chain**	12		
	IND5021 Managing the Digital Supply Chain	4	N	SSG subsidy
	IND5022 Data Analytics for Smart Manufacturing	4	N	SSG subsidy
	DSC5221A Managing the Financial Supply Chain	2	N	SSG subsidy
	IND5024 Strategic Procurement in a Digital World	2	N	SSG subsidy
SoC	**Principles and Practice of Secure Systems** (Choose 3 modules)	12		
	CS5321 Network Security	4	Y	SSG subsidy
	CS5322 Database Security	4	Y	SSG subsidy
	CS5332 Biometric Authentication	4	Y	SSG subsidy
	CS5331 Web Security	4	Y	SSG subsidy
	CS5439 Software Security	4	Y	SSG subsidy
	Digital Business (Choose 3 modules)	12		
	IS5007 Strategising for Global IT-enabled Business Success	4	N	SSG subsidy
	IS5116 Digital Entrepreneurship	4	N	SSG subsidy
	IS5117 Digital Government	4	N	SSG subsidy
	IS5151 Information System Security Policy and Management	4	N	SSG subsidy

Core Modules offered in the Master of Science (Industry 4.0) Programme

IND5001 Introduction to Industry 4.0 and Applications

Module Description:

The 4th Industrial Revolution is characterized by a confluence of different technologies coming together, and massive amounts of data being generated. Companies are incorporating Industry 4.0 technologies into their operations, and creating new business models through digitalizing and transforming their products and services. This has consequences for how companies think about their business.

The course is a core module to understand about business operations and processes, and how the Industry 4.0 technologies can be applied. We will also look innovation frameworks and how these technologies fit into strategic technology transformation roadmaps.

Pre-requisite(s): Nil
Co-requisite(s): Nil
Preclusion(s): Nil
Cross-listing: Nil

IND5002 Digital-Physical Integration in Industry 4.0

Module Description:
This module introduces the key recent technological developments that enable cyber-physical systems, which in turn will define Industry 4.0. Topics will be organized under additive manufacturing, robotics and automation, and Internet of Things. This is a core module in the MSc in Industry 4.0 and provides a common technology foundation for students in that programme.

Pre-requisite(s): Nil
Co-requisite(s): Nil
Preclusion(s): Nil
Cross-listing: Nil

IND5003 Data Analytics for Sense-making

Module Description:
Technological advancements such as cyber-physical systems and the Internet of Things are enabling connected machines which collect a tremendous volume of structured and unstructured data. This module covers essential analytics tools and techniques for performing supervised and unsupervised learning on that data. It focuses on applications in such domains as consumer, human resource, manufacturing, medical and retail to identify patterns and insights for process improvements and decision-making. These tools include the Python programming language; the techniques include frequently used time series models and predictive models such as regression, random forests, neural networks and deep learning.

Pre-requisite(s): Nil
Co-requisite(s): Nil
Preclusion(s): Nil
Cross-listing: DSA5231 Data Analytics for Sense-making

IND5004 Digital Infrastructure and Transformation

Module Description:
This module brings the students through the journey of digitalization in transforming organizations, include how they operate, manufacture products and deliver services.

This module covers two major aspects, namely:
• strategizing organizations for digital transformation; and
• transforming the organization's digital infrastructure.

The first aspect covers:
• fundamentals of digitisation, digitalization, and digital transformation;
• digital transformation dimensions, approaches, and readiness indices;
• stakeholder analysis and change management;
• digital culture and organizational culture transformation; and
• workforce and skillset upgrading.

The second aspect covers the technology building blocks (e.g., cloud computing) and cybersecurity measures and approaches.

Pre-requisite(s): Nil
Co-requisite(s): Nil
Preclusion(s): IS5002 Digital Transformation
Cross-listing: Nil

IND5005/IND5005B Industry Consulting and Application Project

Module Description:
This module will be the last core module of the MSc programme to be taken just prior to graduation, with a view to applying learnings in the programme to actual application of one or more Industry 4.0 technology areas in a company, students will form teams of 3 to 4 people to work on a project implementation in a company, under the supervision of one or more faculty with the appropriate expertise for the project. The outcome will be a prototype or minimum viable product, as well as a report and presentation.

Pre-requisite(s): Pass at least 16 MCs with two core modules including IND5001
Co-requisite(s): Nil
Preclusion(s): Nil
Cross-listing: Nil

IND5005A Professional Career Development *(from AY2020/2021 onwards)*

Module Description:
Equip MSc (i4.0) postgraduates with the essential career management skills and advisory so that they are more effective in managing workplace transitions and in developing strategies to capitalise on new opportunities. Participants will: (i) Enhance their personal brand through effective resumes and online presence (ii) Gain industry insights and hiring trends from an industry professional (iii) Develop professional communication strategies and skills for building networks.

Pre-requisite(s): Nil
Co-requisite(s): Nil
Preclusion(s): Nil
Cross-listing: Nil