
Master of Science (Industry 4.0) Students

List of Core Modules and Elective Modules

- (A) [For students admitted in AY2020/2021 onwards](#)
- (B) [For students admitted in AY2019/2020](#)

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

| Unit | Module Code and Title | MCs | Lab | SSG Subsidy Status |
|---|--|-----------|-----|--------------------|
| Core Modules | | | | |
| | IND5001 Introduction to Industry 4.0 and Applications | 4 | N | N |
| | IND5002 Digital-Physical Integration in Industry 4.0 | 4 | N | N |
| | IND5003 Data Analytics for Sense-making | 4 | N | N |
| | IND5004 Digital Infrastructure and Transformation | 4 | N | N |
| | IND5005A Professional Career Development | 0.5 | N | N |
| | IND5005B Industry Consulting and Application Project | 3.5 | N | N |
| Elective Modules from Graduate Certificate Courses | | | | |
| BIZ | Digital Supply Chain | 12 | | |
| | IND5021 Managing the Digital Supply Chain | 4 | N | Y |
| | IND5022 Data Analytics for Smart Manufacturing | 4 | N | Y |
| | DOS5101A Managing the Financial Supply Chain | 2 | N | Y |
| | IND5024 Strategic Procurement in a Digital World | 2 | N | Y |
| SoC | Digital Business (Choose 3 modules) | 12 | | |
| | IS5007 Strategising for Global IT-enabled Business Success | 4 | N | Y |
| | IS5116 Digital Entrepreneurship | 4 | N | Y |
| | IS5117 Digital Government | 4 | N | Y |
| | IS5151 Information System Security Policy and Management | 4 | N | Y |
| | IS5128 Digital Innovation | 4 | N | N |
| | Principles and Practice of Secure Systems (Choose 3 modules) | 12 | | |
| | CS5321 Network Security | 4 | N | Y |
| | CS5322 Database Security | 4 | N | Y |
| | CS5331 Web Security | 4 | N | Y |
| | CS5332 Biometric Authentication | 4 | N | Y |
| | CS5439 Software Security | 4 | N | Y |
| FoS | Quality Assurance and Yield Optimization (Choose 2 modules) | 8 | | |
| | ST5203 Design of Experiments for Product Design and Process Improvements | 4 | N | Y |
| | ST5208 Analytics for Quality Control and Productivity Improvements | 4 | N | Y |
| | ST5212 Survival Analysis | 4 | N | Y |
| | ST5210 Multivariate Data Analysis | 4 | N | Y |
| | Deep Learning for Industry | 8 | | |
| | DSA5102 Foundations of Machine Learning | 4 | N | Y |
| | DSA5204 Deep Learning and Applications | 4 | N | Y |
| | Data Mining and Interpretation | 8 | | |
| | ST5227 Applied Data Mining | 4 | N | Y |
| | DSA5203 Visual Data Processing and Interpretation | 4 | N | Y |

| Unit | Module Code and Title | MCs | Lab | SSG Subsidy Status |
|-----------------------|--|-----|-----|----------------------|
| ISS | ISY5002 Pattern Recognition Systems <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> Vision Systems Engineering Spatial Reasoning from Sensor Data Real time audio-visual sensing and sense making Practice Project | 10 | Y | Refer to ISS website |
| CDE | Internet of Things (Choose 5 modules) | 10 | | |
| | EE5020 Data Science for Internet of Things | 2 | Y | Y |
| | EE5021 Cloud Based Services for Internet of Things | 2 | Y | Y |
| | EE5022 Cyber Security for Internet of Things | 2 | Y | Y |
| | EE5023 Wireless Networks | 2 | Y | Y |
| | EE5024 Sensor Networks | 2 | Y | Y |
| | EE5025 Intellectual Property: Innovations in IoT | 2 | Y | Y |
| | EE5026 Machine Learning for Data Analytics | 2 | Y | Y |
| | EE5027 Statistical Pattern Recognition | 2 | Y | Y |
| | EE5060 Sensors and Instrumentation for Automation | 2 | Y | Y |
| | EE5061 Industrial Control and Programming | 2 | Y | Y |
| | Robotics and Automation (Choose 3 to 5 modules) | 10 | | |
| | EE5060 Sensors and Instrumentation for Automation | 2 | Y | Y |
| | EE5061 Industrial Control and Programming | 2 | Y | Y |
| | EE5062: Autonomous Systems | 2 | Y | Y |
| | EE5064: Dynamics and Control of Robotic Manipulators | 2 | Y | Y |
| | EE5065: Tenets of AI in Robotics | 2 | Y | Y |
| | ME5402 Advanced Robotics | 4 | Y | N |
| ME5405 Machine Vision | 4 | Y | N | |

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| | IND5002 Digital-Physical Integration in Industry 4.0 | 4 | N | N |
| | IND5003 Data Analytics for Sense-making | 4 | N | N |
| | IND5004 Digital Infrastructure and Transformation | 4 | N | N |
| | IND5005 Industry Consulting and Application Project | 4 | N | N |
| Elective Modules from Graduate Certificate Courses | | | | |
| BIZ | Digital Supply Chain | 12 | | |
| | IND5021 Managing the Digital Supply Chain | 4 | N | Y |
| | IND5022 Data Analytics for Smart Manufacturing | 4 | N | Y |
| | DOS5101A Managing the Financial Supply Chain | 2 | N | Y |
| | IND5024 Strategic Procurement in a Digital World | 2 | N | Y |
| SoC | Digital Business (Choose 3 modules) | 12 | | |
| | IS5007 Strategising for Global IT-enabled Business Success | 4 | N | Y |
| | IS5116 Digital Entrepreneurship | 4 | N | Y |
| | IS5117 Digital Government | 4 | N | Y |
| | IS5151 Information System Security Policy and Management | 4 | N | Y |
| | IS5128 Digital Innovation | 4 | N | N |
| | Principles and Practice of Secure Systems (Choose 3 modules) | 12 | | |
| | CS5321 Network Security | 4 | N | Y |
| | CS5322 Database Security | 4 | N | Y |
| | CS5331 Web Security | 4 | N | Y |
| | CS5332 Biometric Authentication | 4 | N | Y |
| | CS5439 Software Security | 4 | N | Y |
| FoS | Quality Assurance and Yield Optimization (Choose 2 modules) | 8 | | |
| | ST5203 Design of Experiments for Product Design and Process Improvements | 4 | N | Y |
| | ST5208 Analytics for Quality Control and Productivity Improvements | 4 | N | Y |
| | ST5212 Survival Analysis | 4 | N | Y |
| | ST5210 Multivariate Data Analysis | 4 | N | Y |
| | Deep Learning for Industry | 8 | | |
| | DSA5102 Foundations of Machine Learning | 4 | N | Y |
| | DSA5204 Deep Learning and Applications | 4 | N | Y |
| | Data Mining and Interpretation | 8 | | |
| | ST5227 Applied Data Mining | 4 | N | Y |
| | DSA5203 Visual Data Processing and Interpretation | 4 | N | Y |

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| CDE | Internet of Things (Choose 5 modules) | 10 | | |
| | EE5020 Data Science for Internet of Things | 2 | Y | Y |
| | EE5021 Cloud Based Services for Internet of Things | 2 | Y | Y |
| | EE5022 Cyber Security for Internet of Things | 2 | Y | Y |
| | EE5023 Wireless Networks | 2 | Y | Y |
| | EE5024 Sensor Networks | 2 | Y | Y |
| | EE5025 Intellectual Property: Innovations in IoT | 2 | Y | Y |
| | EE5026 Machine Learning for Data Analytics | 2 | Y | Y |
| | EE5027 Statistical Pattern Recognition | 2 | Y | Y |
| | EE5060 Sensors and Instrumentation for Automation | 2 | Y | Y |
| | EE5061 Industrial Control and Programming | 2 | Y | Y |
| | Robotics and Automation (Choose 3 to 5 modules) | 10 | | |
| | EE5060 Sensors and Instrumentation for Automation | 2 | Y | Y |
| | EE5061 Industrial Control and Programming | 2 | Y | Y |
| | EE5062: Autonomous Systems | 2 | Y | Y |
| | EE5064: Dynamics and Control of Robotic Manipulators | 2 | Y | Y |
| | EE5065: Tenets of AI in Robotics | 2 | Y | Y |
| | ME5402 Advanced Robotics | 4 | Y | N |
| ME5405 Machine Vision | 4 | Y | N | |

Core Module Descriptions

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

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

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

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

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

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:

- Enhance their personal brand through effective resumes and online presence
- Gain industry insights and hiring trends from an industry professional
- Develop professional communication strategies and skills for building networks.

Pre-requisite(s): Nil

Co-requisite(s): Nil

Preclusion(s): Nil