OEL301 Overseas Experiential Learning (Germany)

Level: 3
Credit Units: 5 Credit Units
Language: ENGLISH
Presentation Pattern: EVERY JULY

Synopsis:
Situated in the centre of Europe and bordering 11 countries, Germany, with its rich history and culture coupled with strong technology-focus businesses, makes an attractive country on which to base our overseas study mission.

In Singapore, our Volatile, Uncertain, Complex and Ambiguous (VUCA) environment today requires us to be exposed to and be familiar with Disruptive technologies such as the Internet of Things (IOT), automation and robotics, Industry 4.0, artificial intelligence and renewable energy. These technologies will profoundly shape, reform and transform future professions and industries, and essentially everyone's lives. It is an understatement that technology has changed how we work, live, play and interact. In reality, we are in a technological and social maelstrom. Our finite resources cannot solve the "Billion Person Problems" of this world such as food and water, energy, damage to the environment and climate change, education, and aging. There are undeniably benefits from advancement in technology, and embracing technology is our only hope.

Disruptive developments require a radical reconfiguration of entire industry structures and value chains. Enterprises have to understand the new plane of competition and threats from disruptive innovation and reconsider their 'business case'. For example, instead of considering it a zero-sum game between automation and manpower, or robots as substitutes for human workforce, we can reframe automation not as a threat but as an augmentation opportunity to level up, to leverage on technology to add value to our endeavours.
Industry 4.0 project is a strategic initiative by the German Government as part of their High-Tech Strategy 2020 roadmap to fortify Germany as a leader in the manufacturing solutions. Industry 4.0 includes the cyber physical systems which includes IoT (Internet of Things) and cloud computing operating with the manufacturing technologies to provide automation and data exchanges.
The first industrial revolution emerged with the boom of the iron industry, mechanisation of the textile industry are water and steam engine development in the 18th and 19th century for Europe and USA. The second industrial revolution happened between 1870 and 1914 to expand the industries or grow new ones with the use of electricity, assembly line and mass production. The car factory could produce identical products and mass customisation can reduce the cost of production. The third industrial revolution, also termed as the Digital Revolution, consisted of digital technology such as the computing devices, the Internet and the information and communications technology (ICT).
Industry 4.0 is akin to the fourth industrial revolution that encompasses new technologies to connect the physical, digital and biological spaces together to improve effectiveness and efficiency of the businesses. The fourth industrial revolution has a number of remarkable breakthroughs in a number of fields, such as AI, robotics, quantum computing, nanotechnology, 3D printing, IoT, autonomous vehicles and biotechnology.
Industry 4.0 has introduced a concept called "smart factory" which uses cyber systems to monitor the physical processes of the factory and then make decentralised decisions. In this way, a factory can use robots that are connected to a computing system that have integrated machine learning algorithms that can learn. In turn, the robots can be controlled and utilised with very minimal intervention from the human operators.

To be considered Industry 4.0 compliance, the system or factory must adhere to the following: interoperability of devices, information transparency to allow contextualising of information, technical assistance option to allow human intervention in a decision process if a task is deemed to be too difficult or unsafe, and the ability to allow de-centralised decision-making. Along with the advantages of adopting the Industry 4.0 model, there exists certain challenges ranging from reliability and stability of the system, data security/integrity issues and loss of human job opportunities.
Several important research institutions, technology cluster and companies are working to enable Industry 4.0 (e.g. Industry-Science Research Alliance, SmartFactoryKL and Fraunhofer-Gesellschaft). Closer to home, Semiconductor giant Infineon has announced in March 2017 that it will be investing S$105 million over five years to convert its Singapore plant to a "smart factory".
This course is designed to have two parts: introducing participants to German's influence in Singapore and to cutting edge Science and Technological solutions in Berlin and Stuttgart, Germany. In Singapore, participants will learn about German work culture and ethics, Germany's role in the mosaic of international commerce etc. In Germany, participants will have the opportunity to visit German institutions and companies to observe and examine how Germany rebuilt, re-modelled and developed itself to become the undisputed European Union leader today, both in terms of commerce and technology. Participants will visit reputable companies, such as Mercedes Benz Daimler and Porsche. One of the key features of the visits is to look at how productivity and business integration can be enhanced using robotics and IOT or Industry 4.0. In addition, the course will cover bilateral trade and technology sharing and transfer between Germany and Singapore.

Topics:

- Germany's history, economy, political system, businesses, innovation, culture and arts
- Business practices in Germany in business management: Germany "Mittelstand" firms & Innovation Management
- Germany's R&D capabilities
- Entrepreneurship in Germany
- Sustainability and Green City
- Industry 4.0 and Smart Factory

Learning Outcome:

- Demonstrate understanding of the work ethic and professionalism of German organizations and engineers
- Discuss the role of technology in a sustainable society
- Examine the main features of cutting edge technologies and then use social science explanations to explain the strengths and weaknesses, and the advantages and disadvantages of these technologies when implemented in society.
- Deconstruct how their personal worldviews and presumptions about the host country shape the way they address their selected issues.
- Compare business and organizational practices between Germany and Singapore and review how Singapore can learn and benefit from adopting German practices.
- Demonstrate an understanding of Germany's technology sector, establish mutual understanding and communicate with business executives from Germany and Singapore in terms of application of technologies to businesses.
- Apply and appreciate the significance of the impact of technologies on societies and the changes they provoke, and then articulate their opinions, policy recommendations and business/social scientific commentaries about such changes.

Assessment Strategies:

Continuous Assessment Component	**Weightage (%)**
GROUP BASED ASSIGNMENT	20
TUTOR-MARKED ASSIGNMENT	5
TUTOR-MARKED ASSIGNMENT	10

GROUP BASED ASSIGNMENT	25
GROUP BASED ASSIGNMENT	25
TUTOR-MARKED ASSIGNMENT	10
TUTOR-MARKED ASSIGNMENT	5
Sub-Total	**100**

Examinable Component	**Weightage (%)**
Sub-Total	

Weightage Total **100**