Information Technologies and Supply Chain (ITS) Track

March 2015

EMSE-CMP (located in the **Provence** region of France) is now offering an ITS track for international exchange students. Four novel, competitive and practical courses, equivalent to validate 12 US semester credits, are provided 100% in English within this track. Students in industrial engineering related fields from EMSE partner schools are very welcome to apply. Within the track, we would also offer free French lessons and culture integration section to enrich the stay of the visiting students.

The course descriptions are detailed below.

Information Technologies for Supply Chains
Suggested Prerequisite: Operations Management

Nowadays, information systems are critical functions in all companies, especially, those with global competitions. They need to be well organized and operated efficiently for all employees and managers to execute daily routines. This course will start by introducing the global view of information systems ranged from ERP, to database management, Customer Relationship Management (CRM) to Business Intelligence (BI). Key technologies such as the application of electronic data exchange protocol in supply chain will be introduced.

The second objective of this course is to present managerial aspects of information systems in logistics. The goal is to provide the students complementary courses focusing on the management issues in supply chains. The most important concepts of supply chain management and the main issues will be introduced firstly. Lean Management will be addressed as well. Then students will learn the implementations of information systems and traceability in a supply chain and the inter-organizational management of supply chains. In particular, students will realize the functionality within Advanced Planning System (APS) as well as the production of healthcare services by combining altogether what they learnt above. The territorial challenges of the presence and the development of the Port of Marseille will be presented.

The third objective is to provide fundamental insights on how transportation and distribution can be designed and optimized. Key academic research issues in distribution planning: Vehicle routing, warehousing, forecasting will be introduced. Industrial seminars and on-site visits complement the theoretical concepts and provide students with additional practical understanding on the topics. These seminars and visits will be organized so as to cover the main transportation modes (road, railway, maritime and airway) and will involve major players in these domains.

Practical Modeling and Optimization in Logistics
Suggested Prerequisite: Operations Research

Optimization techniques have evolved in the past 20 years and, combined with faster computers and better software, allow more and more complex and large practical problems to be solved. Large savings are induced by improved decision making. This course aims at giving an overview of the most widely-used modeling and solving techniques that are used to solve practical discrete optimization problems, that can be found in many different logistics contexts (production, distribution, workforce planning, ...). A large part of the course will be devoted to the practical aspects of optimization, and in particular to the implementation and usage of Decision Support Systems (DSS): presentation and discussion of quantitative and qualitative impacts of a DSS and problems encountered when implementing a DSS. Various case studies will be presented and analyzed.

Each group will have to read a different article presenting a successful application of optimization in practice. An oral presentation will be done in the class.

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A practical case will be presented. Each group will have to understand and analyze the problem through questions and make a proposal (written report and short oral presentation). The proposal should in particular contain a detailed description of the problem and the definition and presentation of the structure and content of a Decision Support System.

Semiconductor Manufacturing
Suggested Prerequisite: Operations Research; fundamental probabilities/statistics

The complexity of semiconductor fabrication triggers extensive development in research topics and practical applications in recent decades. In this course, concise and critical fundamentals of semiconductor manufacturing process will be firstly introduced in order to bring up the challenging issues, such as the APC framework, recipe qualification management, automatic material handling system, scheduling and sampling, etc., facing the foundry industries nowadays. Latest advancements and treatments with regards to these challenges will be discussed to make students realize the reason why enormous investments (academically/practically) in this domain are necessary and demanding.

One of the key sciences, simulation analysis, will play another important role in this course and aim at providing students with the essential knowledge of developing and analyzing simple but effective simulation models mimic the real world systems. In order to achieve this, students will learn the fundamental concepts of discrete event simulation. They will be able to model, simulate a problem (discrete system), verify and validate their model. Related principles in stochastic process and queuing theory will be reviewed to not only intensify the dynamics in the simulation models but also provide the evaluation insights. In this course, students will learn at least one hands-on simulation software (with full function license) to practice building-up and evaluating simulation models. Students will be able to participate effectively and collaborate with experts to practically exercise modeling the automatic material handling systems in the fab.

The last objective which extends the usage of simulation models is to introduce the fundamental concepts of Design of Experiments (DOE). With the well-designed simulation model, students learn DOE techniques in order to find out the optimized settings which would result in the desired system performance. Without bothering/jeopardizing the real systems, DOE optimization methods will help understand the system behavior and then locate the most appropriate/feasible settings to improve the system.

Communicating Technologies for Supply Chains
Suggested Prerequisite: Basics in supply chain management

The objectives of this course is to present traceability technologies (barcodes, RFID, NFC, etc.) together with mobile telecommunications. Markets, standards, technologies and usages will be discussed. Specialists in this domain will present how these technologies work as well as how they are applied.

RFID technologies will be firstly provided to help students understand the electronic solutions implementing RFID tags. It outlines a practical way for industrial applications. The evolving history of short range communication will be presented, followed by a review of existing technologies. The problems of the power supply of passive tags, solutions implemented for communication with readers and normative aspects will be then discussed in more details. Major technological trends will be presented and followed by some practical sessions on HF and UHF technologies.

The second part of this course is to present the key points in order to make a successful integration of new communication solutions. These concerns range from issues in project management, the usage optimization and simulation to the evaluation of the return on investment. Critical feedbacks will be discussed per businesses and markets, open/closed loop technology choices as well as obstacles and limitations. Case studies will be presented in several areas such as health care, distribution, inventory management, aviation.

The practice of RFID, as a key invention in short-rang communication, for museums and art galleries will be introduced. Students will be enlightened and stimulated to think about future potentials of all short-range communication technologies in their projects.

Track Calendar
The academic duration of ITS track: 1 Sept. 2015 – 31 Feb. 2016.
1st selection in mother schools: May 2015.
2nd selection in EMSE-CMP: June 2015.
Acceptation announcement: Mid-June 2015.
Fundamental French lessons: one hour per week in the academic duration.

Campus and Accommodation
The campus of EMSE-CMP is located at: 880 route de Mimet, 13541 Gardanne, France
International exchange students are eligible to apply for the student dormitory in the campus (depending on the available capacity).

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