Study plan proposition

Student name	***Ramrattan, Rovin Kayshal***
Home institution	Florida Institute of Technology
Degree program at the home institution	Computer Science
Total US credit hours required for graduation	129
Total US credit hours completed by the end of the fall semester of the academic year 2009/2010[1]	99
EU degree sought	BME[2] Software Engineering
Total ECTS credits required for the EU degree	210
Amount of ECTS credits recognized based on studies in the US	147
Amount of ECTS credits to obtain during studies in Europe	68

List of courses to complete in Europe during the spring semester of the academic year 2009/2010 and the fall semester of the academic year 2010/2011

Course code and name (BME/RMA[3])	**ECTS**	**Course code and name FIT**	**US credit hours**	**Semester in Europe**
BMEVISZA213 - Theory of algorithms	5	CSE4081 – Intr. to analysis of algo.	3	Spring
BMEVITMA314 - Management of Information Systems	5	Restricted elective	3	Spring
BMEGT20A01 – Management and Business Economics	4	Free Elective / Social Science Elective	3	Spring
BMEVIAUA369 - Development of data driven applications	4	Restricted elective	3	Spring
BMEVISZA110 - Introduction to the Theory of Computing 2	4	Restricted elective	3	Spring
BMEVIMIA370 - Intelligent system supervision	4	Restricted elective	3	Spring
BMEVIIIA355 - Project Laboratory	6	ECE 4102-Comp. Science Project 2	3	Spring
BMEGT63AF51 - French for Engineers	2	-	-	Spring
BMEVIHIA215 – Computer Networks	4	Restricted elective	3	Spring
IN010 – Technologie des bases de données (Database technologies)	3	Restricted elective	3	Fall
CL 01x – English-French	4	Free Elective / Humanities Elective	3	Fall
PS0003 – Communication Psychology	2	COM 1xxx – Communication Elective	2	Fall
PS001 – Introduction to Psychology	2	PSY 1xxx – Psychology Elective	2	Fall
EL007A – Design of remote sensing systems	4	ENS 4009-Environmental satellite systems and data	3	Fall
BMEVIIIAxxx -Thesis (at the RMA)	15	-	3	Fall

Important remarks and conditions

1. The amount of ECTS credits obtained under BME course code must be at least 52 in order to obtain any BME degree. The above list satisfies this condition.
2. The BME degree in addition to the 210 ECTS credits obtained requires a thesis defense and final examination in two subjects.

[1] Assuming that the student will obtain all credits for the courses selected for the current semester (including PHYsics1001)
[2] Budapest University of Technology and Economics
[3] Royal Military Academy

3. The list of courses may slightly change due to course scheduling conflicts since some of the courses are offered to 3rd or 2nd year students at the BME.
4. Official English language transcripts will be provided to the student by the BME and by the RMA.

Budapest, 26 October, 2009

Prof. János Levendovszky
Deputy Dean for International Affairs (BME VIK)

Descriptions of BME courses:

Development of data driven applications (BMEVIAUA369, 3/1/0/exam/4 credits). The course describes the different aspects of the development of data driven applications. Students acquire competences both in the realization of complex systems working over databases and in the applied methodologies starting with the data layer and ending with the presentation layer. **Contents:** presentation of the most widely used database engines used by the industry. Performance optimization of databases. Multilayer application development from the data layer until the presentation layer. Development issues of intermediate layers. Case study based presentation of the complete design procedure of a data driven information system.

Object oriented software design (BMEVIIIA371, 3/1/0/exam/4 credits). The courses describes the steps of the model based, object oriented software design and implementation procedure. It allows students to consciously apply these principles in a Java based application development with the help of a development environment and by the evaluation of quality indicators. **Contents:** Java summary (a revision by exercises including collections, reflection, and thread management). Realization possibilities of active objects. Thread pools, scheduling in practice. Integrated tools supporting the development process (Eclipse, CVS, Subversion): services and utilization. Principles of Object Oriented (OO) design: cohesion and binding in practice. Design patterns (construction, behavior, structure, functionality, locking, concurrence, events). The essence of persistence, its problems, realization techniques. Serialization, OO database management (ObjectStore), OO relation solutions (Hybernate). XML in practice. XSL, XSLT, Xpath, DTD and XSD. Java support packages. Objects in distributed systems, realization in Java: RMI. Introduction in further topics: standard middleware, CORBA principles. The Swing presentation package. OO metrics, their measurement and measuring tools. Analysis patterns, reengineering, reverse engineering, refactoring, antipatterns.

Intelligent system supervision (BMEVIMIA370, 3/1/0/exam/4 credits). Supervision techniques for large area IT systems and services are presented including the related industrial standards. The course also studies the development of IT supervisory processes for critical and on-demand informatics infrastructures. **Contents:** System supervision targets and tools. Framework systems and their connections (ITIL, ISO/IEC17799, etc.). Infrastructure and service modeling languages (e.g. CIM). Procedure based system management. Configuration management. Generation of application and resource maps. Intel vPRO. IBM ATAMM. CMDB content and management. Choice of running environments (such as different JREs). Performance monitoring. Integrated measurement acquisition, platform surveying. Performance measurement of a single application, estimation of running time and resource requirements by sample experiments. Module and (web)service level monitoring. User monitoring. Robots. Identity supervision. RBAC. Design of capacity expansion. Task migration rule systems. Load balancing and tools helping restructuration. Management of adaptive IT systems. Fundamentals of computer based control and autonomic computing. Software system management. *Post mortem* analysis, software maintenance activities. Management of heterogeneous software environments. Degradation strategies. Fundamentals of self healing systems. Intrusion protection of computer systems. Monitoring agents and rule based adaptive protection strategies. Connection of middleware and wrapper based solutions to system supervision. Example: SAForum, AIS vs. Tivoli. Software maintenance, rejuvenation. Toolsets for automated software distribution and update, patch management. Support for automated software version and tool update of clients. Automation of local and remote software update procedures. Virtualization. Hardware support in modern CPUs. VMWare and Xen. Virtualization as tool for service security. Case studies: supervision of the infrastructure of an enterprise, social computing infrastructure, mission critical (embedded) infrastructure.

Theory of algorithms (BMEVISZA213, 2/2/0/exam/5 credits). Algorithms. Sequential and binary search. Search with some basic data structures, like search tree, AVL tree, B-tree, hash table. Sorting by insertion, merge sort, heap sort, quicksort, bin sort, radix sort and the analysis of these methods. The complexity of sorting. Basic graph theoretical algorithms: BFS, DFS and their applications to determine (strongly) connected components.

Algorithms for acyclic graphs. Finding maximal matching in bipartite graphs. Determining shortest paths by methods of Bellman-Ford, Dijkstra, and Ford. Minimal spanning tree algorithms and the union-find data structure. General algorithmic methods: branch and bound, divide and conquer, dynamic programming. Efficient approximation algorithms. Algorithmically hard problems, the notion of NP and NP-completeness.

Management of information systems (BMEVITMA314, 3/1/0/exam/4 credits). System-level overview and architectures. Strategic level design, implementation and operation tasks. Life cycle of information systems. Total Cost of Ownership, TCO management. Typical architectures, central, client-server, 3-layer schemas. Quality of Services. Reliability, Availability, Serviceability (RAS). Manageability. Asset management, system management, server management, network management,. inventory management, configuration management, power management, Structure of Management Information (SMI). Management Information Base (MIB). Internet Standard MIB, Private MIB. Common Information Model (CIM). Management Object Format (MOF). Simple Network Management Protocol (SNMP). Windows Management Interface (WMI), Web-Based Enterprise Management (WBEM). Standards. Integrated Network and System Management (INSM). Management Information Format (MIF). Desktop Management Task Force (DMTF). Desktop Management Interface (DMI)., Management Interface (MI), Advanced Configuration and Power Interface (ACPI), Boot Integrity Service (BIS). Interoperability issues. Operating tasks. System log, event management, fault management. Data storage management. Scalability basics. Maintenance, maintenance strategies. Documentation standards. Software upgrade.

Management and Business Economics (BMEGT20A001, 4/0/0/practical mark/4 credits). Intended for engineering students who would like a better conceptual understanding of the role of management in the decision making process. This course introduces the essentials of management as they apply within the contemporary work environment. Particular attention is paid to management theories, corporate finance, motivation, leadership, teamwork, change management, quality management, management of technology, economics calculation and operations management. For problem formulation both managerial interpretation and mathematical techniques are applied.

Computer Networks (BMEVIHIA215, 3/1/0/exam/4 credits). Fundamentals in Computer Networks. Classification. History. Standardization. Convergence. Communication of Remote Processes. Modeling and reference Models: ISO-OSI and TCP/IP. Physical Level Data Transmission. Problems of signal generation, signal transmission and data recovery. Analog transmission: modems, standard serial interfaces. Digital transmission: line encoding, codec. Multiplexing techniques: FDM and TDM. Asynchronous and synchronous transmission. Private and public data networks. ISDN, ADSL, cable TV. Data Link Level Data Transmission. Type of services. Tasks to be solved: framing, error control, flow control, link management. Data link protocols. Data Link Level Data Transmission in LANs. Features of LANs. Special characteristics of the LAN Reference Model. MAC protocols. LLC protocols. Wireless LAN protocols. Network Level Data Transmission. Type of services in packet swithed networks: datagram and virtual circuit. Routing. Congestion control. Interconnection of networks. Gateway, router, bridge, switch, repeater. Internet protocols. Transport Level Data Transmission. Type of services. Elements of protocols. Addressing. Transport connection management. Flow control. Multiplexing. TCP and UDP. Higher Level Services. Session and presentation level services. Application Level Services and Protocols. Application level of TCP/IP Reference Model. DNS. E-mail. Web. Network Management. Reasons of network management. Tasks to be solved. Hardware and software elements. SNMP.