Partial Curriculum at Telecom Paris

Statistics: a first course *(Eric Moulines)*

This course is designed to provide an overview of elementary/intermediate level statistical procedures routinely used by engineers. The course is also designed to prepare students for more advanced statistical techniques presented in other modules. The course is structured to emphasize the conceptual understanding of probability and statistical procedures and their applications. The following topics are covered: decision theory in the frequentist and bayesian framework, estimation (leas-squares, maximum likelihood) and hypothesis testing (Neyman Pearson, Generalized likelihood ratio)

Objects Software Engineering *(Sylvie Vignes)*

Objectives
The Object-Oriented approach is widely accepted as a key paradigm in software engineering. It is supported by mature languages and technologies and it has a common standardized modeling language UML. Accordingly, the object-oriented model changed the way applications were built, addressing an important, even so limited, aspect of the whole software manufacturing cycle. The current challenge is to address the "plug and play" approach, using reusable frameworks for building distributed component-based system.

Students will gain expertise on object modeling, on requirements engineering and for developing component-based Information System or E-services frameworks for the Internet.

Contents
The program covers the following subject areas:
- OO languages and technologies foundations : Abstraction mechanisms, including encapsulation of behavior, inheritance and polymorphism, programming with contracts (C++, Java, Eiffel);
- OO modeling and analysis, use case for requirement analysis;
- Formal methods technology: formal specification and documentation, requirements Validation, critical properties Verification, model checking, reliability;
- Information System processes extending UML notation: Industrial experience and case studies, mapping to database modeling
- Component-based development : Software architecture (Description languages and styles), Pattern Design, OO frameworks (concurrent and networked objects), Entreprise Java Beans, Corba components.

Organisation
Students have both lectures and practical works. In addition to the core courses, students develop with the help of a tutor, experimental projects in various domains such as Information Systems or E-services frameworks for the Internet (telecommunication services, Web-based IS, E-business, video server)

Pattern Recognition *(Laurence Likforman)*

This course is a first course for pattern recognition. Pattern recognition methods are divided into statistical, stochastic and structural ones. We present here the theoretical framework for

all these technics and the context for their applications. The following topics are covered (bayesian decision theory, linear discriminant functions, neural networks , hidden markov models, recognition with strings or trees, and grammatical methods.
The course also includes computer exercices which illustrate the algorithms.