

## PM Ph.D. course

# An Introduction to Intelligent Transport Systems (ITS) (7,5 credits)

### **Aim**

The aim of the course is that the participants should develop further knowledge and understanding of ITS from different perspectives.

### **Learning goals**

The participants should, after completing the course, be able to:

- provide an account of different definitions of ITS, as well as discuss and assess the consequences that these different definitions may have on the analysis, development, and/or evaluation of ITS;
- describe, discuss, and critically assess the motives behind the emergence of ITS from different perspectives;
- describe and analyse the present situation (state-of-the-art) of ITS research including research questions, methods and results;
- discuss and position their own research in relation the present situation (state-of-the-art) of ITS research
- provide an account of, and in relation to development work, analyse and assess the prerequisites for and obstacles of successful development and implementation of ITS.

### **Participants**

The primary target group for the course includes Ph.D. students who are members of the national postgraduate school "Intelligent Transport Systems". A secondary target group includes other Ph.D. students in related areas.

### **Content**

The course will address the following aspects in lectures and seminars:

- What is ITS?  
*ITS from a historical perspective*  
*How is ITS defined – in an international perspective? Are there different definitions?*  
*Which could be the implications of the different definitions for ITS R&D?*
- Why ITS?  
*What problems, on different levels, are ITS expected to solve? For instance, safety problems, efficiency problems, comfort problems, and economics problems? On a societal level, an organisational level, a business level, and/or an individual level ?*
- ITS related research and research questions (state-of-the-art)  
*What is the relation between research and development work ?*  
*What type(s) of research has been and is carried out in the ITS area?*  
*Which research questions have been the dominant ones over time?*  
*How can and how could ITS be researched and by which methods?*  
*The research questions have been addressed how? And by what disciplines?*

*What is known today on the topic of ITS and what are the possible “white areas”?*

- The development of ITS  
*Perspectives on technical development (e.g., technology-push versus demand-pull, technology-oriented versus user-oriented perspectives)*  
*The development process for ITS – what are the characteristics?*
- What factors will have an effect on ITS? What factors does a development of sustainable ITS need to consider?<sup>1</sup> For instance,
  - *system borders and system levels;*
  - *integrated approaches (i.e. not only road but air, rail, etc. as well), also referred to as intermodality, multimodality, co-modality;*
  - *the needs and requirements of different stakeholders, incl. end users;*
  - *diffusion, acceptance and adoption;*
  - *HMI/MMI issues;*
  - *technical preconditions, possibilities and restraints;*
  - *contextual aspects; and*
  - *business models and managerial issues*
- Case descriptions

### **Completion**

The course amounts to 7,5 credits (corresponding to approx. 200 hours work). The course will run for a period of five months, from September 2008 until January 2009.

The course encompasses:

- Common lectures and seminars at 4 different occasions (see Schedule). Meeting I encompasses one ½-day (afternoon); meeting II, 2 half days (afternoon and morning); meeting III, 2 half days (afternoon and morning); and meeting IV, a full day (morning and afternoon), together adding up to approximately 30 hours.
- Individual work including literature studies (see Course Literature). The participant will provide an account of the literature studies at the lectures/seminars (meetings II, III, and IV) as well as in the analysis of the project/case. The literature studies are allocated approx. 50 hours.
- Individual work including an analysis of an (completed) ITS development project/case. Each course participants will be assigned an ITS project. The participant will then analyse the project/case with the help of lectures/seminars and available literature, and report on the analysis in a written report. Available literature encompasses the literature included in the course literature (see Course Literature) as well as literature of the course participant's own choice. The analysis, including a survey of relevant literature; reading case specific material; analysis; and written report, is estimated to require approx. 120 hours.

### **Examination**

The participant will receive a Fail or Pass.

In order to pass the course, the participant is required to actively take part in lectures and seminars (at least at 3 of the 4 occasions); and complete the analysis of an ITS project/case according to the structure described in Appendix 1.

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<sup>1</sup> These different aspects will be developed further in a series of courses provided by the postgraduate school.

## Course literature

### Compulsory literature

- ITS Handbook
- A selection of journal papers/book chapters

### Reference literature

- ETSC (1999): Intelligent Transportation Systems and Road Safety. European Transport Safety Council, Brussels.
- Delegationen för Transportinformatik (1996): Transportinformatik för Sverige. Slutbetänkande från Delegationen för Transportinformatik. SOU 1996:186.
- Delegationen för Transportinformatik (1994): Vägval för IT i trafiken. En debattskrift om transportinformatik. K 1994:08.

## Examiner

Prof. MariAnne Karlsson, Chalmers University of Technology

## Schedule

<i>Date</i>	<i>Content</i>	<i>Lecturer</i>
I: Sept. 23, 2008 in Stockholm	<i>Course introduction</i> <i>What is ITS? Why ITS?</i> <i>ITS in a historical</i> <i>perspective: Realtime</i> <i>information as an example</i> <i>Presentation &amp; allocation of</i> <i>development projects/cases</i>	Prof. MariAnne Karlsson <sup>2</sup> Prof. Stig Franzén Prof. Haris N. Koutsopoulos  Prof. MariAnne Karlsson
II: Nov. 6-7, 2008 in Lund	<i>ITS Research</i> <i>ITS research questions and</i> <i>research methodology</i> <i>Case presentation</i>	Prof. András Varhelyi <sup>3</sup>
III: Dec 2-3, 2008 in Göteborg	<i>ITS Development</i> <i>Case presentation</i>	Prof. Stig Franzén <sup>4</sup>
IV: Jan. 7 2009 in Linköping ( in connection with VTIs Forskardagar)	<i>Completion of course</i> <i>Presentation of cases</i>	Prof. MariAnne Karlsson

<sup>2</sup> Responsible for theme I. Detailed schedule will be distributed

<sup>3</sup> Responsible for theme II. Detailed schedule will be distributed

<sup>4</sup> Responsible for theme III. Detailed schedule will be distributed

## Appendix 1

In order to pass the course, the participant must complete an analysis of an ITS R&D project – a case. Each participant will be assigned a specific project.

Each analysis should address (minimum) the following main questions:

- *What was the rationale – the motives – behind the project? What were the problems to be addressed?*
- *What aim and what goals were formulated? Did these concern an individual level, an organisational level, a business level, and/or a societal level?*
- *How was the project organised and completed? Were the aims and goals mirrored in the way it was completed (e.g. activities; methods, actors, etc.) of the project?*
- *Which perspectives, if any, dominated the project? Was it, e.g., a project with a clear technology orientation? Or was the project a user-centred design project?*
- *Did the project reach the defined aim and/or goals? Why/why not? Were, and if so how, the results evaluated? Did the evaluation mirror the specified aim and goals?*

The basis for the analysis is available literature in terms of written reports, conference and/or journal papers. Additional information sources can (and should) be used.

The analysis should be communicated orally, as well as in writing. This will be completed in four stages:

- *At Meeting II (in November) the participants should be able to describe and discuss the aim and goals of the projects as well as the completion of the projects relative its aim and goals.*
- *At Meeting III (in December) the participants should be able to describe and discuss the results, as well as the scientific and societal relevance of the projects.*
- *A draft of the written report should be handed in **2008-12-21** at the latest. Each participant will be assigned a report to read and comment on at the final meeting (Meeting IV).*
- *At Meeting IV (in January), the participants will present the complete analysis (compare above). An oral presentation will be given in connection with the completion of the course. Each participant will be have 15 minutes for the presentation of the project. An additional 15 minutes will be allocated for questions and discussion with specific input from the “peer reviewer”.*
- *The final report should be handed in **2009-01-15** at the latest. The report should encompass a maximum of 20 pages (not including Appendices). A recommended number of pages is 10 and 15 (not including Appendices). The report should be written in English and include the following:*
  - *An account of the background to the work, the aim and goals, the delimitations, and the methodology/research approach used;*
  - *A presentation of the project/the case*
  - *An analysis of the project*
  - *Discussion and Conclusions*
  - *References*