Aston CPD Centre
BIRMINGHAM

‘Intelligent Transport Systems’: Advances in Traffic Engineering

Post Experience Certificate in Traffic Engineering

Distance learning course. Flexible start dates.

Part A – Distance Learning Training Modules

For the award of the **Post Experience Certificate in Intelligent Transport Systems (ITS)** all SIX modules must be completed, together with coursework (short report/analysis). A certificate of achievement will be awarded upon satisfactory completion of each module. Start dates are flexible, with modules due for completion within 30 working days of receiving the course materials.

The certificate will demonstrate an ability to carry out analysis on day-to-day Traffic Engineering work. Individual modules may be undertaken for CPD purposes.

The course is technical in nature, but is deliberately designed to be understood by Students who may not have a background in physics, mathematics or engineering. Those who have studied these subjects will nevertheless be challenged in many circumstances.

An important influence on all modules is to relate ITS to real world circumstances, de-mystifying the subject such that the technology is seen as a tool to assist the traffic engineer or (highway) network operator.

Each module will involve approximately 25 hours of study, except for the final session which is more involved where it is expected that 35 - 40 hours will be required. The formal assessment will form part of the study time excluding coursework. As this course has been prepared to enable Students to gain a high level of understanding of ITS and the benefits of system integration, it would not be appropriate to move onto a subsequent module without completing the previous one. An external examiner will review the coursework.

Module 1: Intelligent Transport Systems (ITS) – Background and Concepts

This module examines the history of ITS and the individual subsets which combine to make up ITS.

The need for road traffic Monitoring, Control, Information and Enforcement will be discussed briefly and the applicability of each will be explored. The entire nature of this module as well as those to come will be to integrate the technical elements of ITS with the use of the technology.

The module is designed to provide an overview of ITS and its applicability worldwide to engineers, planners and other students from “engineering” and “non-engineering” backgrounds. Examples will be given of different “philosophies” and ITS application in diverse locations including Western Europe, Eastern Europe, North America, the Middle East, Australasia and the Far East. Examples of applicability of ITS for the developing world will also be presented.

Students will be expected to undertake a short exercise to identify all the sub sets of ITS they have come across in their professional or personal lives and to consider what the sub system operators may be using the ITS for.

Module 2: ITS – Monitoring of Traffic

This module looks at road traffic monitoring and the various techniques for measuring and recording flow, speed and other parameters relating to traffic such as vehicle weight. The strengths and weaknesses of various automated detection technology will be addressed with examples of each.

The reasons for measuring traffic parameters and the collection of other traffic/vehicle data will be discussed. To place this discussion into context, the capacity relationships between speed and flow will be noted, explained and commented upon with theoretical and practical examples. Concepts such as level of service, congestion reference flow, free flow and the interrelationships with vehicle performance will be explored such that in later modules, the effect of the control of traffic through ITS can be understood and applied. Students will be given examples of traffic flow profiles and be shown how these can be interpreted. As Closed Circuit Television (CCTV) has become an extremely important tool for network managers, this sub set of ITS will be considered at length, particularly the individual elements (camera, communications, displays and operation).

From data provided, Students are expected to undertake a short exercise in compiling graphs of traffic flow and to use these to comment upon the general status of the locations where the data comes from.

Module 3: ITS – Control of Traffic (Junctions and Networks)

Most of this module will focus on traffic signals and the operational elements of this means of junction control. An introduction into junction capacity with traffic signals will be made, along with the basis concepts of traffic signals.

The means by which traffic signals can “cycle” round will be made by the use of examples and mathematical logical statements. Examples will be given as to the practicalities of traffic signal design and installation and important international differences will be discussed and analysed.

Students will be shown, by means of examples, how the monitoring (detection) of traffic and pedestrians are incorporated into the operation of traffic signals and how the interrelationship of the demand (for green time) and signal layout affect the junction’s capacity. A specific example will be made of public transport priority within traffic signals using a combination of automatic vehicle location (dealt with in sub sequent modules) and special “logical change conditions”. Adaptive and fixed time linking will be addressed.

The concepts of centralised control and the role of a control centre will be addressed. The need for communications between equipment and the requirement for system operators will be discussed at length. Established and emerging techniques for intersystem communication will be presented and strengths and weaknesses of each will be postulated.

Students will be asked to undertake a short exercise to research and identify the growth in the importance and function of traffic control centres in urban areas.

Module 4: **ITS – Traveller Information**

With the rapid improvement and advances in technology in general, people tend to expect accurate, timely and relevant information to be available to them continually. Travellers now expect that relevant information about their intended or actual journey should be available such that informed decisions can be made about the remainder of a journey or a potential journey. Prior to information being available for dissemination, the data must be collected and analysed by automated and semi automated equipment and software. There must also be a means of displaying the information to a traveller. Therefore, this module will address the whole scope of traveller information from the initial collection through to the display of the data for both private and public transport,

Examples of information dissemination will be given and all the individual components of ITS and supporting infrastructure will be set out and analysed. Strengths and weaknesses will be suggested and the applicability to different applications will be drawn out. The philosophical and actual benefits of information availability to the individual and/or network will be made.

At the conclusion of this module, Students will be expected to undertake a brief analysis of road based information systems which may be of benefit to travellers prior to a journey commencing.

Module 5: **ITS – Enforcement**

With the availability of many reliable automated data collection techniques, ITS can offer means of very efficient enforcement which may range from access control through to the automated levying of fines when the motorist contravenes laws or codes.

The module will consider the application of enforcement techniques, building upon the work conducted within the previous modules. Concepts such as ANPR (Automated Number Plate Recognition) and the consequential actions from vehicle identification will be addressed and explored.

An increasingly important part of automated enforcement is within tolling systems whereby the high throughput of traffic at toll plazas (or even congestion charging sites), relies upon quick and reliable transactions of 100% of traffic. As the toll collection technology advances, very reliable and low cost enforcement systems are also required.

At the end of this module, Students will be expected to complete a short exercise to prepare a system architecture for a simple speed enforcement system on an expressway.

Module 6: **ITS – System Integration**

This session brings together all the previous modules and discussed at length the operational and financial benefits of integrating the sub elements of ITS.

Detailed descriptions of system architecture will be made, with the focus being on the traffic control centre. Operational requirements for integrated systems will be addressed and the drawbacks of incremental development will be made. As the integration of ITS is critically dependent upon reliable, cheap and efficient communications between different sub systems, the module will discuss the different technologies available which will range from copper cable through to Wi-Fi and the internet.

Descriptions and characteristics of urban and interurban technologies will be covered such as smart motorways (freeways) and real time journey planning from actual measurements within vehicles and other sub systems.

The issue of “legacy” systems and the integration with the newer ITS technology will be presented and solutions suggested. This will include ITS which may “translate” the operational characteristics of separate non integrated sub systems into a common operational user interface.

The module will suggest the future developments which might be expected to occur with integrated ITS such as virtual control centres and the use of in-vehicle intelligence to provide data to the control centres and vice versa.

Of necessity, Students will be made aware of the means by which ITS has been and can be procured, with the different operational models. An all encompassing discussion will be presented which will consider the benefits of integrated ITS to the end user (the road user), the operator and to the networks on which ITS has been applied.

As this module is extremely important to the overall understanding of the applicability and desirability of ITS, the coursework will be more extensive than previous modules, with Students being expected to draw upon previous work to describe in detail the technology which they would apply to a road network they are familiar with via the production of a short “specification” which might be sent to prospective suppliers. Included within this will be a description of how signs might be controlled from traffic flow monitoring.

Part B – Coursework and Reporting

The coursework and reporting is a simple exercise of putting the study into practice. This will help the student to understand the modules and appreciate the applicability of ITS to their own location. A very important part of the final exercise is the reinforcement of the concept of system integration.

CONTACT

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Please enrol me on the following components of the **‘Intelligent Transport Systems’: Advances in Traffic Engineering** course, (Subject to terms & conditions)

Module # 1 @ £245 ☐ Module # 2 @ £245 ☐ Module # 3 @ £245 ☐

Module # 4 @ £245 ☐ Module # 5 @ £245 ☐ Module # 6 @ £245 ☐

All six modules @ £1350 ☐

Please send all correspondence to:
Aston CPD Centre, Aston House, 6 Greville Drive, University, Birmingham, B15 2UU

Please reserve ……. place(s) at the **‘Intelligent Transport Systems’: Advances in Traffic Engineering** course as indicated above.

Student Name(s) and Company ……...

Address ……
……

Tel No: ……Fax No: ……

Email Address: ……

Do you wish to be invoiced? YES/NO……...

Total Cost £……. being for: Module 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

All six modules @ £1350 ☐

(Cheques should be made payable to Aston CPD)