Study Plan and Course Descriptions of Master of Science in Intelligent Transportation and Logistics Systems (MITLS)

Ref: UC/P 634/2023

As approved by University Council Decision No. UC/2397/08/2022-23 of meeting No. UC/08/2022-23 held on Tuesday the 18th of April 2023.

This document is to be effective as of the First Semester 2023/2024

Ahlia University
COLLEGE OF ENGINEERING
MASTER OF SCIENCE IN INTELLIGENT TRANSPORTATION AND LOGISTICS SYSTEMS
MITLS -Opt 1

MITLS -Opt 1 - Foundation * (6 CREDITS)

Course	Code	Course Title	Lec	Lab	Cr	Prerequisite
ITLS	500	Highway and Traffic Engineering Fundamentals	3	0	3	
ITLS	501	Operational Management	3	0	3	
					6	

* Not counted towards the 36 credits necessary for the MITLS degree
* Student with GPA <2.5 are subject to taking foundation courses

MITLS -Opt 1 - FIRST YEAR (18 CREDITS)

First Semester

Course	Code	Course Title	Lec	Lab	Cr	Prerequisite
ITLS	511	Fundamentals of Intelligent Transport and Logistics Systems	3	0	3	
ITLS	514	Optimization Techniques in Transport and Logistics	2	2	3	
ITLS	521	Urban Mobility and Smart Cities	2	2	3	
					9	

Second Semester

Course	Code	Course Title	Lec	Lab	Cr	Prerequisite
ITLS	527	Geographical Information Systems for Transportation	2	2	3	
ITLS	528	Mobile and Network Communication for Transport Systems	2	2	3	
ITLS	597	Research Methodology	2	2	3	Completion of at least 9 credits
					9	

MITLS -Opt 1 - SECOND YEAR (18 CREDITS)

First Semester

Course	Code	Course Title	Lec	Lab	Cr	Prerequisite
ITLS	XXX	Major Elective	X	X	3	
ITLS	XXX	Major Elective	X	X	3	
					6	

Second Semester

Course	Code	Course Title	Lec	Lab	Cr	Prerequisite
ITLS	599	Dissertation in Intelligent Transportation and Logistics Systems	0	24	12	ITLS 597 AND Completion of at least 21 credits And Minimum CGPA 3
					12	

LIST OF MAJOR ELECTIVE COURSES

Course	Code	Course Title	Lec	Lab	Cr	Prerequisite
ITLS	513	Traffic and Transport Safety	2	2	3	ITLS 511
ITLS	517	Innovation Project Management	3	0	3	ITLS 514
ITLS	518	Transportation Policy, Strategy and Regulations	3	0	3	ITLS 511
ITLS	525	Supply Chain Logistics	2	2	3	ITLS 514
ITLS	531	Internet of Things	2	2	3	ITLS 528
ITLS	537	Data Analytics for Smart and Connected Cities	2	2	3	ITLS 528
ITLS	539	Connected and Automated Vehicles	2	2	3	

The MITLS programme comprises of 36 credit hours distributed as follows: 18 hours core courses, (6) hours electives, in addition MITLS students may opt for either OPTION 1 DISSERTATION [12 credits] or OPTION 2 APPLIED PROJECT [6 credits] as classified in the study plan.

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MITLS -Opt 1 - Foundation * (6 CREDITS)

Course	Code	Course Title	Lec	Lab	Cr	Prerequisite
ITLS	500	Highway and Traffic Engineering Fundamentals	3	0	3	
		This course provides students with basic highway and traffic engineering knowledge. It describes the transport planning and process including the transportation models and their main standards. The course covers four main modules: traffic engineering and management, highway design, and maintenance.				
ITLS	501	Operational Management	3	0	3	
		This course provides students the basic knowledge of operations management in the supply chain. The course emphasizes decision-making in operations with a supply chain orientation. This course stresses the cross-functional decision to manage activities involved in moving products, materials, services, and information by making systematic approaches. Students will learn how to improve business logistics and supply chain management decisions through the practical application of multiple analytic techniques used by managers in the field. This course emphasizes operations management in transportation systems management and warehouse management.				
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* Student with GPA <2.5 are subject to taking foundation courses

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MITLS -Opt 1 - FIRST YEAR (18 CREDITS)

First Semester

Course	Code	Course Title	Lec	Lab	Cr	Prerequisite
ITLS	511	Fundamentals of Intelligent Transport and Logistics Systems	3	0	3	
		The course provides learners with critical knowledge and understanding in relation to Intelligent Transport and Logistics Systems. The course provides an overview on the background and history of transportation, emphasizing the fundamental role and importance of the transportation and logistics industry in economy, companies, society, and the environment. Learners will be equipped with specialized theories and principles related to different carrier operations, management, technology, and strategic principles for managing different modes of transportation.				
ITLS	514	Optimization Techniques in Transport and Logistics	2	2	3	
		This course provides the learners critical applied knowledge to use of professional skills with various computer applications and optimization techniques in transport and logistics systems. The course provides an overview on complex issues that arise in areas such as vehicle distribution, route planning, and resource allocation, and the underlying concepts and modelling techniques used to solve them through critical thinking and analytical approaches. The course emphasizes practical application, with learners working on realistic case studies to design solutions using computer optimization tools and techniques that enables the leaners to generate high-quality solutions for the complex problems that arise in transport and logistics systems.				
ITLS	521	Urban Mobility and Smart Cities	2	2	3	
		Urban mobility and smart cities are areas of rapidly growing importance especially in the context of urban infrastructure management. Recent advances in Information and Communication Technologies (ICTs) have disrupted traditional urban infrastructure service provision, leading to growing interest in transitioning towards Smart Cities. This course will equip learners with critical knowledge and skills needed to utilize smart urban technologies to enhance existing infrastructures cities to overcome the challenges and opportunities and leverage technology to enhance urban infrastructure management.				
					9	

Second Semester

Course	Code	Course Title	Lec	Lab	Cr	Prerequisite
ITLS	527	Geographical Information Systems for Transportation	2	2	3	
This course provides critical knowledge of Geographic Information Systems (GIS) and its application in transportation infrastructure and road safety analysis. The course focuses on the essentials of GIS, geospatial data collection and management, database design, geo-referencing techniques, and visualization. Topics covered will include advanced topics in GIS such as spatial analysis and modeling, multilayer mapping, and overlay analysis. By the end of the course, learners will have a solid understanding of GIS and its application in transportation infrastructure and road safety analysis, as well as the ability to apply GIS tools and techniques to solve real-world problems.						
ITLS	528	Mobile and Network Communication for Transport Systems	2	2	3	
Mobile and networks communication for transport systems explores elements of radio telecommunications systems, including transmitters, receivers, antennas, and channels, and how they interact to transmit information over distances. Learners will gain critical knowledge of the function of each element and how to evaluate system performance using a simple channel model. This course covers the use of magnitudes and units commonly used in telecommunications, essential skills for working with radio communications in intelligent transportation systems. By the end of the course, learners will be equipped with professional level of skills and understanding related to radio telecommunications systems and their application in transportation.						
ITLS	597	Research Methodology	2	2	3	Completion of at least 9 credits
This course is designed to provide learners with in-depth framework and methodologies for conducting research in transport and logistics systems. Learners will gain critical knowledge of the principles of the scientific methods including hypotheses, literature review, research design and development, analysis of data, and dissemination, communication, and exploitation of research results, as well as ethical considerations. By the end of the course, learners will be equipped with professional skills to design, execute, and communicate research results of in the field of intelligent transport and logistics.						
					9	

MITLS -Opt 1 - SECOND YEAR (18 CREDITS)

First Semester

Course	Code	Course Title	Lec	Lab	Cr	Prerequisite
ITLS	XXX	Major Elective	X	X	3	
ITLS	XXX	Major Elective	X	X	3	
					6	

Second Semester

Course	Code	Course Title	Lec	Lab	Cr	Prerequisite
ITLS	599	Dissertation in Intelligent Transportation and Logistics Systems	0	24	12	ITLS 597 AND Completion of at least 21 credits And Minimum CGPA 3
This course will provide a structured supervised in-depth study on a pre-approved topic in the field of Intelligent Transportation and Logistics Systems involving one of three methodologies: (1) a literature-focused study which aims to critically discuss the literature within a specified topic area; (2) a research focused study which aims to draw on practical data to assess critically a specified area or topic; or (3) a practical development study which aims to explore an area or ideas, or demonstrate a concept through appropriate practical development testing and critical analysis. The dissertation engages the learner in a progressive course of intellectual discourse involving problem identification of complex issues related to Intelligent Transportation and Logistics Systems, methodology, critical analysis and research, evaluation and recommendation that culminates in the production of manuscript subject to defense.						
					12	

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LIST OF MAJOR ELECTIVE COURSES

Course	Code	Course Title	Lec	Lab	Cr	Prerequisite
ITLS	513	Traffic and Transport Safety	2	2	3	ITLS 511
		This course provides a critical knowledge and understanding of Intelligent Transportation Systems (ITS) with inclusion of using information and communication technologies to improve transportation safety, productivity, and reliability. The course focuses on ITS applications that enhance road traffic and safety, through advanced information systems, vehicle-to-vehicle and vehicle-to-infrastructure communication, and sensors. The course emphasizes the importance of ITS in enhancing road safety and provides learners with the knowledge and skills needed to understand and apply these technologies in transportation systems. By the end of the course, learners will be equipped with critical skills and combination of concepts of ITS towards improving traffic safety.				
ITLS	517	Innovation Project Management	3	0	3	ITLS 514
		This course covers the main functions of Innovation Project Management, observation of Innovation Management as the idea commercialization process, and Project Management as the evolvement of generated and strategically adapted ideas. This course will help students to understand the examination of Innovation Strategy, Innovation Matrix, key strategic decisions, risk assessing, planning methods, and the whole process of project implementation based on a strong practical emphasis including case studies. The course is delivered with emphasis on applied knowledge through case studies, enabling learners to gain critical understanding of the challenges and opportunities associated with innovation project management. By the end of the course, learners will be equipped with critical knowledge and skills to manage and implement innovative projects successfully.				
ITLS	518	Transportation Policy, Strategy and Regulations	3	0	3	ITLS 511
		This course will provide critical knowledge and understanding in the field of Transportation Policy, Strategy and Regulations with a significant knowledge of key concepts in transport planning and policymaking, the course will be focused on the development of transport systems. Learners will be equipped with professional skills and creativity to provide insights into the challenges associated with transport system operation in local and regional cities by studying a range of case studies which expose learners to real-world examples of transport system development and management. Topics covered include current concepts in the strategic management, operating context, leadership challenges, strategies, and management tools of public and private transportation organizations. By the end of the course, learners will be equipped with professional skills related to transport planning and policymaking, as well as the strategic management of transportation organizations.				
ITLS	525	Supply Chain Logistics	2	2	3	ITLS 514
		This course offers an international and global perspectives on logistics and supply chain management trends and issues. Topics covered include the advanced study and application of concepts and managerial techniques for manufacturing and service operations in supply chain logistics. The course focuses on the role of logistics in supply chains, including production technology, facility location and layout, inventory management, Material Requirements Planning (MRP), just-in-time manufacturing, total quality management, and distribution activities. Learners will gain a comprehensive and critical understanding of logistics in supply chain management and how logistics plays a crucial role to lead successful supply chain operations in a global business environment. By the end of the course, learners will have critical knowledge and professional skills to manage complex logistics for supply chain operations.				
ITLS	531	Internet of Things	2	2	3	ITLS 528
		This course focuses provide critical knowledge related to communication systems between vehicles, users, and other elements based on Internet of Things (IoT) architectures. Topics covered include different alternatives for locating computation closer or further away from the data source, including fog, edge, and cloud computing, other topics including ad hoc vehicular networks (VANETS) and vehicular sensor networks (VSN), which capture massive amounts of data that can be used in the context of big data, real-world applications managing transport in port terminals, railway facilities, road traffic, goods storage, and parking will also be covered, including the use of beacons to communicate with merchandise or means of transport.				
ITLS	537	Data Analytics for Smart and Connected Cities	2	2	3	ITLS 528
		The availability of large amounts of information in these areas requires the use of appropriate models to analyse and predict future trends. This course focuses on the use of adequate study and prediction methodologies for transport and logistics systems, socio-demography, urban and territorial characteristics, and activity centres. Learners will gain professional skills related to the use of classic activity and travel models, which provide the basis for working with agent-based models that take advantage of all available information. The course emphasizes the importance of using appropriate methodologies for analysing and predicting transport and logistics systems and provides learners with the knowledge and skills needed to work with agent-based models in this context.				
ITLS	539	Connected and Automated Vehicles	2	2	3	
		This course provides critical understanding of concepts of autonomous, connected, and cooperative driving, with an emphasis on their impact on traffic, road safety, and emissions. The course covers topics related to different levels of automation, sensors and technologies, infrastructure, different types of communication and the legislation and regulations associated with autonomous vehicles. Learners will gain critical knowledge and exposure on recent road classification systems that consider the unique features of autonomous vehicles, the impact of autonomous driving on traffic functionality, road safety, and the environment will be covered.				

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MITLS -Opt2

MITLS -Opt2 - Foundation * (6 CREDITS)

Course	Code	Course Title	Lec	Lab	Cr	Prerequisite
ITLS	500	Highway and Traffic Engineering Fundamentals	3	0	3	
ITLS	501	Operational Management	3	0	3	
					6	

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MITLS -Opt2 - FIRST YEAR (18 CREDITS)

First Semester

Course	Code	Course Title	Lec	Lab	Cr	Prerequisite
ITLS	511	Fundamentals of Intelligent Transport and Logistics Systems	3	0	3	
ITLS	514	Optimization Techniques in Transport and Logistics	2	2	3	
ITLS	521	Urban Mobility and Smart Cities	2	2	3	
					9	

Second Semester

Course	Code	Course Title	Lec	Lab	Cr	Prerequisite
ITLS	527	Geographical Information Systems for Transportation	2	2	3	
ITLS	597	Research Methodology	2	2	3	Completion of at least 9 credits
ITLS	528	Mobile and Network Communication for Transport Systems	2	2	3	
					9	

MITLS -Opt2 - SECOND YEAR (18 CREDITS)

First Semester

Course	Code	Course Title	Lec	Lab	Cr	Prerequisite
ITLS	XXX	Major Elective	X	X	3	
ITLS	XXX	Major Elective	X	X	3	
ITLS	XXX	Major Elective	X	X	3	
					9	

Second Semester

Course	Code	Course Title	Lec	Lab	Cr	Prerequisite
ITLS	XXX	Major Elective	X	X	3	
ITLS	598	Applied Project in Intelligent Transportation and Logistics Systems	0	12	6	ITLS 597 AND Completion of at least 24 credits And Minimum CGPA 3
					9	

LIST OF MAJOR ELECTIVE COURSES

Course	Code	Course Title	Lec	Lab	Cr	Prerequisite
ITLS	513	Traffic and Transport Safety	2	2	3	ITLS 511
ITLS	517	Innovation Project Management	3	0	3	ITLS 514
ITLS	518	Transportation Policy, Strategy and Regulations	3	0	3	ITLS 511
ITLS	525	Supply Chain Logistics	2	2	3	ITLS 514
ITLS	531	Internet of Things	2	2	3	ITLS 528
ITLS	537	Data Analytics for Smart and Connected Cities	2	2	3	ITLS 528
ITLS	539	Connected and Automated Vehicles	2	2	3	

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MITLS -Opt2

MITLS -Opt2 - Foundation * (6 CREDITS)

Course	Code	Course Title	Lec	Lab	Cr	Prerequisite
ITLS	500	Highway and Traffic Engineering Fundamentals	3	0	3	
This course provides students with basic highway and traffic engineering knowledge. It describes the transport planning and process including the transportation models and their main standards. The course covers four main modules: traffic engineering and management, highway design, and maintenance.						
ITLS	501	Operational Management	3	0	3	
This course provides students the basic knowledge of operations management in the supply chain. The course emphasizes decision-making in operations with a supply chain orientation. This course stresses the cross-functional decision to manage activities involved in moving products, materials, services, and information by making systematic approaches. Students will learn how to improve business logistics and supply chain management decisions through the practical application of multiple analytic techniques used by managers in the field. This course emphasizes operations management in transportation systems management and warehouse management.						
					6	

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MITLS -Opt2 - FIRST YEAR (18 CREDITS)

First Semester

Course	Code	Course Title	Lec	Lab	Cr	Prerequisite
ITLS	511	Fundamentals of Intelligent Transport and Logistics Systems	3	0	3	
The course provides learners with critical knowledge and understanding in relation to Intelligent Transport and Logistics Systems. The course provides an overview on the background and history of transportation, emphasizing the fundamental role and importance of the transportation and logistics industry in economy, companies, society, and the environment. Learners will be equipped with specialized theories and principles related to different carrier operations, management, technology, and strategic principles for managing different modes of transportation.						
ITLS	514	Optimization Techniques in Transport and Logistics	2	2	3	
This course provides the learners critical applied knowledge to use of professional skills with various computer applications and optimization techniques in transport and logistics systems. The course provides an overview on complex issues that arise in areas such as vehicle distribution, route planning, and resource allocation, and the underlying concepts and modelling techniques used to solve them through critical thinking and analytical approaches. The course emphasizes practical application, with learners working on realistic case studies to design solutions using computer optimization tools and techniques that enables the leaners to generate high-quality solutions for the complex problems that arise in transport and logistics systems.						
ITLS	521	Urban Mobility and Smart Cities	2	2	3	
Urban mobility and smart cities are areas of rapidly growing importance especially in the context of urban infrastructure management. Recent advances in Information and Communication Technologies (ICTs) have disrupted traditional urban infrastructure service provision, leading to growing interest in transitioning towards Smart Cities. This course will equip learners with critical knowledge and skills needed to utilize smart urban technologies to enhance existing infrastructures cities to overcome the challenges and opportunities and leverage technology to enhance urban infrastructure management.						
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MITLS -Opt2

Second Semester

Course	Code	Course Title	Lec	Lab	Cr	Prerequisite
ITLS	527	Geographical Information Systems for Transportation	2	2	3	
This course provides critical knowledge of Geographic Information Systems (GIS) and its application in transportation infrastructure and road safety analysis. The course focuses on the essentials of GIS, geospatial data collection and management, database design, geo-referencing techniques, and visualization. Topics covered will include advanced topics in GIS such as spatial analysis and modeling, multilayer mapping, and overlay analysis. By the end of the course, learners will have a solid understanding of GIS and its application in transportation infrastructure and road safety analysis, as well as the ability to apply GIS tools and techniques to solve real-world problems.						
ITLS	597	Research Methodology	2	2	3	Completion of at least 9 credits
This course is designed to provide learners with in-depth framework and methodologies for conducting research in transport and logistics systems. Learners will gain critical knowledge of the principles of the scientific methods including hypotheses, literature review, research design and development, analysis of data, and dissemination, communication, and exploitation of research results, as well as ethical considerations. By the end of the course, learners will be equipped with professional skills to design, execute, and communicate research results of in the field of intelligent transport and logistics.						
ITLS	528	Mobile and Network Communication for Transport Systems	2	2	3	
Mobile and networks communication for transport systems explores elements of radio telecommunications systems, including transmitters, receivers, antennas, and channels, and how they interact to transmit information over distances. Learners will gain critical knowledge of the function of each element and how to evaluate system performance using a simple channel model. This course covers the use of magnitudes and units commonly used in telecommunications, essential skills for working with radio communications in intelligent transportation systems. By the end of the course, learners will be equipped with professional level of skills and understanding related to radio telecommunications systems and their application in transportation.						
					9	

MITLS -Opt2 - SECOND YEAR (18 CREDITS)

First Semester

Course	Code	Course Title	Lec	Lab	Cr	Prerequisite
ITLS	XXX	Major Elective	X	X	3	
ITLS	XXX	Major Elective	X	X	3	
ITLS	XXX	Major Elective	X	X	3	
					9	

Second Semester

Course	Code	Course Title	Lec	Lab	Cr	Prerequisite
ITLS	XXX	Major Elective	X	X	3	
ITLS	598	Applied Project in Intelligent Transportation and Logistics Systems	0	12	6	ITLS 597 AND Completion of at least 24 credits And Minimum CGPA 3
The course will provide professional skills to be applied by learners to conduct applied project in the field of Intelligent Transport and Logistics Systems. The course will provide a combination of approaches to critically analyze complex practical situation and evaluate practices to support practical implications serving industrial needs. The course will include management and leadership related aspects the learner will be equipped with skills to develop resources and practice tools and reflect on the outcomes. At the end of the course learners is expected to solve a complex specific and provide insight to support the organization and demonstrate skills in project management, problem solving, and communication.						
					9	

LIST OF MAJOR ELECTIVE COURSES

Course	Code	Course Title	Lec	Lab	Cr	Prerequisite
ITLS	513	Traffic and Transport Safety	2	2	3	ITLS 511
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ITLS	517	Innovation Project Management	3	0	3	ITLS 514
		This course covers the main functions of Innovation Project Management, observation of Innovation Management as the idea commercialization process, and Project Management as the evolvement of generated and strategically adapted ideas. This course will help students to understand the examination of Innovation Strategy, Innovation Matrix, key strategic decisions, risk assessing, planning methods, and the whole process of project implementation based on a strong practical emphasis including case studies. The course is delivered with emphasis on applied knowledge through case studies, enabling learners to gain critical understanding of the challenges and opportunities associated with innovation project management. By the end of the course, learners will be equipped with critical knowledge and skills to manage and implement innovative projects successfully.				
ITLS	518	Transportation Policy, Strategy and Regulations	3	0	3	ITLS 511
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ITLS	525	Supply Chain Logistics	2	2	3	ITLS 514
		This course offers an international and global perspectives on logistics and supply chain management trends and issues. Topics covered include the advanced study and application of concepts and managerial techniques for manufacturing and service operations in supply chain logistics. The course focuses on the role of logistics in supply chains, including production technology, facility location and layout, inventory management, Material Requirements Planning (MRP), just-in-time manufacturing, total quality management, and distribution activities. Learners will gain a comprehensive and critical understanding of logistics in supply chain management and how logistics plays a crucial role to lead successful supply chain operations in a global business environment. By the end of the course, learners will have critical knowledge and professional skills to manage complex logistics for supply chain operations.				
ITLS	531	Internet of Things	2	2	3	ITLS 528
		This course focuses provide critical knowledge related to communication systems between vehicles, users, and other elements based on Internet of Things (IoT) architectures. Topics covered include different alternatives for locating computation closer or further away from the data source, including fog, edge, and cloud computing, other topics including ad hoc vehicular networks (VANETS) and vehicular sensor networks (VSN), which capture massive amounts of data that can be used in the context of big data, real-world applications managing transport in port terminals, railway facilities, road traffic, goods storage, and parking will also be covered, including the use of beacons to communicate with merchandise or means of transport.				
ITLS	537	Data Analytics for Smart and Connected Cities	2	2	3	ITLS 528
		The availability of large amounts of information in these areas requires the use of appropriate models to analyse and predict future trends. This course focuses on the use of adequate study and prediction methodologies for transport and logistics systems, socio-demography, urban and territorial characteristics, and activity centres. Learners will gain professional skills related to the use of classic activity and travel models, which provide the basis for working with agent-based models that take advantage of all available information. The course emphasizes the importance of using appropriate methodologies for analysing and predicting transport and logistics systems and provides learners with the knowledge and skills needed to work with agent-based models in this context.				
ITLS	539	Connected and Automated Vehicles	2	2	3	
		This course provides critical understanding of concepts of autonomous, connected, and cooperative driving, with an emphasis on their impact on traffic, road safety, and emissions. The course covers topics related to different levels of automation, sensors and technologies, infrastructure, different types of communication and the legislation and regulations associated with autonomous vehicles. Learners will gain critical knowledge and exposure on recent road classification systems that consider the unique features of autonomous vehicles, the impact of autonomous driving on traffic functionality, road safety, and the environment will be covered.				

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