



**Master of Engineering  
Program in Automotive Engineering  
(International Program)  
(New Program B.E. 2550)**

**Department of Mechanical Engineering  
Faculty of Engineering  
King Mongkut's Institute of Technology Ladkrabang**

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**Master of Engineering Program in Automotive Engineering  
Internationally Collaborative Program with Tokyo Institute of Technology,  
Sirindhorn International Institute of Technology and  
National Science and Technology Development Agency  
(New Program B.E.2550)  
Department of Mechanical Engineering  
Faculty of Engineering  
King Mongkut's Institute of Technology Ladkrabang**

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**1. Program Title**

**Designation in Thai :** หลักสูตรวิศวกรรมศาสตรมหาบัณฑิต สาขาวิชาวิศวกรรมยานยนต์  
(หลักสูตรนานาชาติ)

**Designation in English :** Master of Engineering Program in Automotive Engineering  
(International Program)

**2. Degree Title**

Full Designation in Thai : วิศวกรรมศาสตรมหาบัณฑิต (วิศวกรรมยานยนต์)

Abbreviated Designation in Thai : วศ.ม. (วิศวกรรมยานยนต์)

Full Designation in English : Master of Engineering (Automotive Engineering)

Abbreviated Designation in English : M.Eng. (Automotive Engineering)

**3. Responsible Organizations:**

1. King Mongkut's Institute of Technology Ladkrabang (KMITL) Chalongkrung Rd.,  
Ladkrabang, Bangkok 10520, Thailand. Tel. +66(0)2737 2500-47 ext. 3959  
Fax. +66(0)2739 2490
  - 1.1 Faculty of Engineering
  - 1.2 School of Graduate Studies
2. Sirindhorn International Institute of Technology (SIIT), Thammasat University - Rangsit  
Campus P.O.Box 22, Pathum Thani 12121, Thailand. Tel. +66 (0) 2986 9009, 2986 9101,  
Fax. +66(0) 2986 9112-3
3. National Science and Technology Development Agency (NSTDA), Thailand Science  
Park, 111 Paholyothin Rd., Klong 1, Klongluang, Pathumthani 12120, Thailand  
Tel. +66(0)2564 7000, Fax +66(0)2564 7005
4. Tokyo Institute of Technology (TIT) 2-12-1 Ookayama, Meguro-ku, Tokyo 152-8550,  
Japan. Tel : +81-3-5734-3027 Fax : +81-3-5734-3677

**4. Philosophy and Objective of the Program**

The automotive industry requires trained engineers who have a global perspective, international exposure and knowledge of diverse topics. Taking the requirements of the automotive industry in mind and considering the expansion that is taking place, the Master of Engineering Program in Automotive Engineering has been developed to create industry-ready engineers who have all the required qualities. It is the opportunity for Thai students to establish an international career and profit from the outsourcing wave that is benefiting all sectors of the economy.

## **5. Commencement of the Program**

The program will be launched in the academic year 2007.

## **6. Applicant Qualification**

6.1 Bachelor degree in engineering or related fields with the consensus of the Admission Committee of the program and /

6.2 The applicant must have obtained GPA higher than 2.75 or be within top 25 % of the class or /

6.3 The applicant must hold a satisfactory score on the appropriate entrance examination required for admission by the Admission Committee of the program.

## **7. Admissions**

The applicant will be selected by the Admission Committee including the representatives from each member institute.

## **8. Academic System**

Semester system : Each academic year consists of two regular 15-week semesters plus one summer which equivalent to a regular 16-week semester.

## **9. Time Requirement**

One academic year runs over two regular semesters, each of which contains 16 weeks. Ordinarily, students are expected to complete the program within 2 years (full time study). Each student must fulfill all requirements for the degree within 5 years from the date of his first enrollment.

## **10. Registration**

All requirements regarding thesis examination must comply with KMITL's regulation on Graduate Studies, year 2006, Section 6.

## **11. Academic Evaluation and Graduation**

To be qualified for graduation, the student must have fulfilled all requirements according to KMITL's regulation on Graduate Studies, year 2006, Sections 10, 15 and

1. Completed at least 24 credits of taught courses, 12 credits of thesis and 2 credits of seminar.
2. Earned the cumulative GPA at least 3.00 or equivalent.
3. TOEFL not less than 530 marks or equivalent (For example TU-GET)
4. Passed the thesis examination
5. At least one national journal paper or international journal paper or 2 international conference papers accepted for publication

## **Thesis Examination**

All requirements regarding thesis examination must comply with KMITL's regulation on Graduate Studies, year 2006, Section 15.

## 12. Academic's Staff

### 12.1 Faculty Members (อาจารย์ประจำหลักสูตร)

Full name	Educational Background	Academic Profile
*1. Asst. Prof. Dr. Chinda Charoenphonphanich	D.Eng (Mechanical Engineering) Tokai University, JAPAN	- Automotive Engineering - Alternative Fuel Vehicle - In-cylinder Flow Visualization
*2. Dr.Ammart Kanarat	Ph.D. (Mechanical Eng), Virginia Tech, USA	- Robotics - Control
*3. Dr. Nattawoot Depaiwa	D. Eng. (Mechanical Engineering), Chiba University , Japan	- Machine Design - Human interface system
4. Asst. Prof. Dr. Monsak Pimsarn	Ph.D., (Mechanical Eng. ) University of Connecticut , USA	- Gear design - Finite Element Method - CAD, CAE
5. Assoc. Prof. Thavee Teschareon	M.Eng. (Mechanical Eng. ) , King Mongkut's Institute of Technology Ladkrabang, Thailand	- Manufacturing process - Machine design

### \* Coordinating Faculty Members (อาจารย์ผู้รับผิดชอบหลักสูตร)

### 12.2 Lecturers

Full name	Educational Background	Academic Profile
1. Assoc. Prof. Dr.Mongkol Mongkolwongrojn	M.Sc. (Mechanical Engineering), Ph.D. (Mechanical Engineering), University of Wisconsin-Madison, USA	-Power plant engineering -Mechanical vibration -Tribology -Optimum design of mechanical system Computer control of machine and process
2. Assoc. Prof. Dr.Pongjet Promvonge	M.Sc. (Mechanical Engineering), Ph.D. (Mechanical Engineering), Imperial College, University of London, UK	-Heat exchanger -Energy conservation -Biomass fired vortex combustor
3. Assoc. Prof. Somchai Norasethasopon	M. Eng (Mechanical Eng. ), Chulalongkorn University , THAILAND	-Mechanics of Materials - Strength of Materials - Strength of Composite Materials - Wire Drawing - Forging - Automotive Technology
4. Assoc. Prof. Thavee Teschareon	M.Eng. (Mechanical Eng. ), King Mongkut's Institute of Technology Ladkrabang, Thailand	- Manufacturing process - Machine design

<b>Full name</b>	<b>Educational Background</b>	<b>Academic Profile</b>
5. Assoc. Prof. Dr.Jaruwat Charoensuk	Ph.D. (Mechanical Engineering), Imperial College, University of London, UK	-Mathematical Modelling of Sulfur Oxide Formation in Pulverized Combustor -Adsorbtion Modelling of calcined Particles for Reduction of Sulfuroxide in Industrial Combustors
6. Asst. Prof. Ming Lokitsangtong	M.Eng. (Mechanical Eng. ), King Mongkut's University of Technology Thonburi, THAILAND	- Noise reduction - Vibration
7. Assoc. Prof. Dr.Chinaruk Thianpong	Ph.D. (Mechanical Engineering), University of Manchester, UK	- Heat transfer to a rotating disk - The reduction of unburned hydrocarbon during cold start engine
8. Asst. Prof. Dr. Chinda Charoenphonphanich	D .Eng (Mechanical Engineering)Tokai University, JAPAN	- Automotive Engineering - Alternative Fuel Vehicle - In-cylinder Flow Visualization
9. Asst. Prof. Dr.Unnat Pinsopon	M.Sc. (Mechanical Engineering), Ph.D. (Mechanical Engineering), University of Illinois- Chicago, USA	- Nanometer order precision serve positioning system using piezo- Electricactuator - Velocity control of open center hydraulic system using neural network algorithm
10. Asst. Prof. Dr.Monsak Pimsarn	Ph.D., (Mechanical Eng. ) University of Connecticut , USA	- Gear design - Finite Element Method - CAD, CAE
11. Dr.Amnart Kanarat	Ph.D.(Mechanical Eng), Virginia Tech, USA	- Robotics - Control
12. Dr. Nattawoot Depaiwa	D.Eng. (Mechanical Engineering), Chiba University , Japan	- Machine Design - Human interface system
13. Asst. Prof. Monton Jhaikuson	M.Eng. (Mechanical Eng. ), Chulalongkorn University , THAILAND	- Fluid Dynamics - Turbo Machines
14. Asst. Prof. Pongsak Kummul	M.Eng (Mechanical Eng. ) King Mongkut's Institute of Technology Ladkrabang, THAILAND	- Automotive Engineering - Low fuel consumption vehicles

### 12.3 Adjunct Faculty Members from SIIT

Full name	Educational Background	Academic Profile
1. Assoc.Prof.Dr. Bundit Limmeechokchai	D.Eng. in Energy Economics & Planning, Asian Institute of Technology, THAILAND	<ul style="list-style-type: none"> <li>- Energy conservation</li> <li>- Management, and policy</li> <li>- Modeling of energy and environment systems</li> </ul>
2. Asst.Prof.Dr. Jirachai Buddhakulsomsiri	Ph.D. in Industrial Engineering, Oregon State University, USA	<ul style="list-style-type: none"> <li>- Applied operations research</li> <li>- Data mining, Production planning and control</li> <li>- Systems simulation and Engineering economics analysis.</li> </ul>
3. Asst.Prof.Dr. Lalita Tantimuratha	Ph.D. in Process Integration, University of Manchester Institute of Science and Technology (UMIST), UK	<ul style="list-style-type: none"> <li>- Heat recovery network</li> </ul>
4. Assoc.Prof.Dr. Navee Chiadamrong	Ph.D. in Manufacturing Engineering and Operations Management, University of Nottingham, UK	<ul style="list-style-type: none"> <li>- Cellular manufacturing systems (CMS)</li> <li>- Advanced manufacturing systems</li> <li>- Systems simulation, Production planning and control</li> <li>- Supply chain management.</li> </ul>
5. Assoc.Prof.Dr. Pisal Yenradee	D.Eng. in Industrial Engineering and Management, Asian Institute of Technology (AIT), THAILAND	<ul style="list-style-type: none"> <li>- Production and Inventory control (P&amp;IC) systems JIT, MRP, and TOC; P&amp;IC systems for Thai industries P&amp;IC in supply chain</li> <li>- Applied operations research; Systems simulation.</li> </ul>

<b>Full name</b>	<b>Educational Background</b>	<b>Academic Profile</b>
6. Assoc.Prof.Dr. Ruengsak Kawtummachai	Ph.D. in Production System, Okayama University, JAPAN	- Scheduling, Production planning and control - Just-in-time production, Inventory control - Production system, Supply Chain, Logistics.
7. Assoc.Prof.Dr. Satha Aphornratana	Ph.D. in Mechanical Engineering, University of Sheffield, ENGLAND	- Refrigeration system
8. Assoc.Prof.Dr. Supachart Chungpaibulpatana	D.Eng. in Energy Technology, Asian Institute of Technology, Bangkok, THAILAND	- Thermal engineering, Solar energy, Energy conservation and management - Energy policy and planning
9. Assoc.Prof.Dr. Thananchai Leephakpreeda	Ph.D. in Mechanical Engineering, The University of Akron, Ohio, USA	- Process control and modeling - Robotics, Expert control system, Neural networks and fuzzy logics, Process identification, Numerical simulation and optimization

#### 12.4 Adjunct Faculty Members form Tokyo Tech.

<b>Full name</b>	<b>Educational Background</b>	<b>Academic Profile</b>
1. Assoc. Prof. Dr.Hidenori Kosaka	D.Eng (Mechanical Engineering), Tokyo Institute of Technology, Japan	- Internal combustion engines - Combustion engineering - Thermo-fluid dynamics - Optical Diagnostics
2. Dr. Hiroaki Morimura	D.Eng (Mechanical Engineering), Tokyo Institute of Technology, Japan	- Noise and Vibration - Mechanical engineering of Automotive design - Computer simulation
3. Assoc. Prof. Dr. Itsuo Kajiwara	D.Eng (Mechanical Engineering), Tokyo Institute of Technology, Japan	- Automotive control - Vibration and acoustic control, Multidisciplinary design optimization - Laser control technology
4. Prof.Dr. Katsunori Hanamura	D.Eng (Mechanical Engineering), Tokyo Institute of Technology, Japan	- Thermal Engineering - Radiation Heat Transfer, Combustion Engineering
5. Prof.Dr. Ken Okazaki	D.Eng (Mechanical Engineering), Tokyo Institute of Technology, Japan	- Clean and high efficiency coal/biomass technology for the protection of global environment

<b>Full name</b>	<b>Educational Background</b>	<b>Academic Profile</b>
6. Assoc.Prof.Dr. Kunio Takahashi	D. Eng Department of Welding, Faculty of Engineering, Osaka University, JAPAN	- Science and Technology of Joining and Welding processes based on Contact Mechanics - Material Science, Surface Science, Surface Analyses, Molecular Mechanics, and Quantum Mechanics. Engineering for sustainability
7. Prof.Dr. Masaaki Okuma	D.Eng (Mechanical Engineering), Tokyo Institute of Technology, JAPAN	- Structural dynamics, vibration and noise control, acoustic information recognition, etc
8. Assoc.Prof.Dr. Tadaharu Adashi	D.Eng (Mechanical Engineering), Tokyo Institute of Technology, JAPAN	- Mechanics of materials and structures - Mechanical properties of polymers and polymer Mechanical properties of inhomogeneous/ heterogeneous materials - Impact engineering, structural collapse, Mechanical properties of light weight materials and structures.
9. Prof.Dr. Takeyuki Kamimoto	D.Eng (Mechanical Engineering), Tokyo Institute of Technology, JAPAN	- Processes of formation and extinction of soot particles in the engine cylinder and the effects of high injection pressure on diesel combustion and emissions. Characterization of diesel soot particles in exhaust
10. Dr. Takashi Kitahara	D.Eng (Mechanical Engineering), Tokyo Institute of Technology, JAPAN	-Vehicle Dynamics, Noise and Vibration, Vehicle Test and Experiment - Proving Ground Design, R&D Management, R&D Planning
11. Prof.Dr. Yoshio Saito	D.Eng (Mechanical Engineering), Tokyo Institute of Technology, JAPAN	- Production Engineering, Machining Process, Integrated Manufacturing System, - Machine Tool Design, CNC Control, CAD/CAM

<b>Full name</b>	<b>Educational Background</b>	<b>Research Area</b>
12. Prof.Ichiro Hagiwara	D.Eng (Mechanical Engineering), The University of Tokyo, JAPAN	- CAD/CAM/CAE/CG/C- Control, Sound & Vibration, Vehicle Collision
13. Prof.Dr. Masami Miyakawa	D.Eng (Mechanical Engineering), The university of Tokyo, JAPAN	- Applied statistics - Multivariate analysis - Design of experiments, Statistical quality control

### 13. Number of Student Enrollment and Graduation

<b>Students</b>	<b>Year 2007</b>	<b>Year 2008</b>	<b>Year 2009</b>	<b>Year 2010</b>	<b>Year 2011</b>
1 <sup>st</sup> Year	30	30	30	30	30
2 <sup>nd</sup> Year	-	30	30	30	30
Total	30	60	60	60	60
Expected to Graduate	-	-	30	30	30

### 14. Location and Facilities

#### 14.1 Location

- 14.1.1 Department of Mechanical Engineering, Faculty of Engineering, King Mongkut's Institute of Technology Ladkrabang, Chalongkrung Road, Bangkok 10520, Thailand.
- 14.1.2 Sirindhorn International Institute of Technology (SIIT), Thammasat University - Rangsit Campus P.O.Box 22, Pathum Thani 12121, Thailand.
- 14.1.3 National Science and Technology Development Agency (NSTDA), Thailand Science Park, 111 Paholyothin Rd., Klong 1, Klongluang, Pathumthani 12120, Thailand
- 14.1.4 Tokyo Institute of Technology (TIT) 2-12-1 Ookayama, Meguro-ku, Tokyo 152-8550, Japan.

#### 14.2 Facilities

##### 14.2.1 King Mongkut's Institute of Technology Ladkrabang's Laboratory

- Automotive Technology Laboratory
  - Chassis dynamometer 200 PS
  - Engine dynamometer 60 PS
  - Engine analyzer
  - Smoke density tester
  - Exhaust gas analyzer
  - Sectioned Engine and Vehicle component
- Computer Laboratory
  - Computers are connected through the Institute's network with the Internet access available.
  - Computer software including engineering software for simulation or analysis
- Engineering Work Shop
  - Basic machine tool
  - CNC machine
- Teleconference room

### 14.2.2 Sirindhorn International Institute of Technology's Computer Center

SIIT Computer Center is located on the third floor of SIIT building. The center is equipped with microcomputers in three separate rooms, two of which are used mainly for instruction purpose on programming, mathematical problem solving, engineering graphic design and professional report preparation, while the other room is used by students for general computing purposes. Up-to-date software packages are installed via servers on the local area network allowing students to become proficient with their applications. The local area network system supports both academic and administrative chores which include the library's computer-based services, e-learning/instruction, finance, and the internal mailing system for faculty members and staff. There are a number of servers for academic purposes in various programs. The local area network is connected to the Internet via the Thammasat-Rangsit fiber optic backbone. Students, faculty members and staff are provided with an individual e-mail address and service. Dial-up service is also available.

## 15. Library

### 15.1 King Mongkut's Institute of Technology Ladkrabang's Library

Library	Books		Journals	
	Thai	English	Thai	English
Central Library	67,716	47,130	1,232	266
Faculty of Engineering Library	13,640	29,387	37	155
Faculty of Architecture Library	15,020	21,194	90	71
Faculty of Agricultural Technology Library	21,307	9,724	251	143
Faculty of Science Library	6,239	13,664	106	200
Faculty of Industrial Education Library	30,907	11,109	260	85
Faculty of Information Technology Library	1,600	3,519	86	21
<b>Total</b>	<b>156,429</b>	<b>135,727</b>	<b>2,062</b>	<b>941</b>

Update on 31<sup>st</sup> December 2006

### 15.2 Sirindhorn International Institute of Technology's Library

Since the establishment of the Library and Information Services Center in 1994. The Library at Rangsit has a total floor area of 2,518.5 square meters with a seating capacity of 490. A branch library of 1,200 square meters with a seating capacity of 180 was set up for SIIT at Bangkadi in October 2004. At present, the SIIT Library (at Rangsit and Bangkadi) has in total 29,000 volumes of publications and 472 titles of periodicals (technical journals, magazines, and newsletters) with 126 titles (English – 88 titles, Thai – 38 titles) are currently subscribed and 10 English titles are complimentary subscriptions. The Library also subscribes to 30 titles of ASCE online journals.

Integrated Library System and Computer Facilities



## Elective Courses 9 Credits

A student must select 9 credits as elective courses from the following.

<b>Course Code</b>	<b>Course Title</b>	<b>Credits</b>
01267101	AUTOMOTIVE STRUCTURAL SYSTEM ENGINEERING	3 (3-0-6)
01267102	AUTOMOTIVE COMFORT MECHANICS ENGINEERING	3 (3-0-6)
01267103	COMBUSTION ENGINEERING	3 (3-0-6)
01267104	ADVANCED INTERNAL COMBUSTION ENGINE ENGINEERING AND FUTURE POWER TRAIN	3 (3-0-6)
01267105	ADVANCED PRODUCTION ENGINEERING	3 (3-0-6)
01267106	ALTERNATIVE VEHICLE PROPULSION SYSTEMS	3 (3-0-6)
01267107	VEHICLE ACOUSTICS	3 (3-0-6)
01267108	MECHATRONIC SYSTEMS IN AUTOMOTIVE ENGINEERING	3 (3-0-6)
01267109	CURRENT TOPICS IN AUTOMOTIVE ENGINEERING	3 (3-0-6)
01267110	ADVANCED TOPICS IN AUTOMOTIVE ENGINEERING	3 (3-0-6)
01267111	SELECTED TOPICS IN AUTOMOTIVE ENGINEERING	3 (3-0-6)

### Seminar

<b>Course Code</b>	<b>Course Title</b>	<b>Credits</b>
01267201	SEMINAR IN AUTOMOTIVE ENGINEERING	2 (0-2-0)

### Thesis

<b>Course Code</b>	<b>Course Title</b>	<b>Credits</b>
01267301	THESIS 1	6(0-18-0)
01267302	THESIS 2	6(0-18-0)

## 17.4 Meaning of Course Code

All course codes contain 8 digits. They are identified as follows:

The first two digits	01	means Faculty of Engineering
The third and fourth digits	26	means Mechanical Engineering (Automotive Program )
The fifth digit	7	means graduate course
The sixth, seventh and eight digit		means course number

## 17.5 Study Plan

<b>First Semester</b>		
<b>Course Code</b>	<b>Course Title</b>	<b>Credits</b>
01267001	FUNDAMENTAL OF AUTOMOTIVE ENGINEERING	3(3-0-6)
0126700x	MATHEMATICS	3(3-0-6)
	ELECTIVE COURSE	3(3-0-6)
	ELECTIVE COURSE	3(3-0-6)
	<b>Total</b>	<b>12(12-0-24)</b>
<b>Second Semester</b>		
<b>Course Code</b>	<b>Course Title</b>	<b>Credits</b>
01267002	BASICS OF AUTOMOTIVE DESIGN	3(3-0-6)
01267003	PRACTICE OF AUTOMOTIVE DESIGN	3(2-1-4.5)
	ELECTIVE COURSE	3(3-0-6)
	ELECTIVE COURSE	3(3-0-6)
	<b>Total</b>	<b>12(11-1-22.5)</b>
<b>Third Semester</b>		
<b>Course Code</b>	<b>Course Title</b>	<b>Credits</b>
01267201	SEMINAR IN AUTOMOTIVE ENGINEERING	2(0-2-0)
01267301	THESIS 1	6(0-18-0)
	<b>Total</b>	<b>8(0-20-0)</b>
<b>Fourth Semester</b>		
<b>Course Code</b>	<b>Course Title</b>	<b>Credits</b>
01267302	THESIS 2	6 (0-18-0)
	<b>Total</b>	<b>6(0-18-0)</b>
	<b>Grand Total</b>	<b>38(23-39-46.5)</b>

## 17.6 Course Description

### Required Courses:

#### **01267001 FUNDAMENTAL OF AUTOMOTIVE ENGINEERING 3 (3-0-6) Credits**

Introduction to automotive engineering systems and ground vehicle design, this course involves engine type and parts, power train, body and chassis, automotive electrical system, chassis, transmission systems, suspension systems, steering systems, tyre and wheel, handling and maintenance, troubleshooting and repairs and alternative fuel engine. This course is also included the vehicle design concentrating primarily on vehicle dynamics. In particular it examines the primary features of vehicle design that relate to performance: suspension, steering, chassis, and tires. It uses the latest in industry standard software to examine the various design parameters influencing vehicle performance and handling.

**01267002      BASICS OF AUTOMOTIVE DESIGN      3 (3-0-6) Credits**  
Basics of CAD, CAE and CAE model is including overview of CAD, theory of curved line and curved surface, theory of mesh generation and theory of reverse engineering. Basic of CAE is including overview of CAE, technology for analysis ( Finite Element Method, Boundary Element Method, Optimization Analysis, Control Engineering) and application examples. CAE model is including generating CAE model from CAD, generating CAE Model from Measured DATA, generating CAE Model from Experiments and Identification of CAE Model

**01267003      PRACTICE OF AUTOMOTIVE DESIGN      3 (2-1-4.5) Credits**  
Practice of Design (1) / Design of SAE-Formula Car is including planning of vehicle, harmonization of Performance and Components, concept of Frame Structures, analysis of strength and stiffness with CAD/CAE. Practice of Design (2) / Analysis of SAE-Formula Car is including tuning of engine performance and gear ratio, braking effort and brake-lock, performance of circling movements and maneuverability. Assembly and disassembly of engine and beam Model is including disassembly of engine and measurement of components, assembly of engine, assembly of miniature beam model for frame structure and measurement of beam model

## **Mathematics**

**01267004      DECISION MAKING AND OPTIMIZATION      3 (3-0-6) Credits**  
Fundamental optimization tools for quantitative analysis to develop modeling and decision-making skill in management sciences; Linear programming; Integer programming; Nonlinear programming; Goal programming; Game theory; Markov chains; Queuing theory and decision analysis techniques; Advanced topics in optimization.

**01267005      NUMERICAL METHODS FOR ENGINEERING      3 (3-0-6) Credits**  
Programming concepts and techniques; Modern programming languages and computational tools for engineering problems; Numerical methods as applied to practical engineering problems; Introduction to finite element methods.

**01267006      COMPUTATIONAL MATHEMATICS      3 (3-0-6) Credits**  
Set theory; Relations; Formal proof methods; Finite automata; Regular expressions; Context-free grammar; Pushdown automata; First order logic; Theories related to counting, graphs and networks; Interplay between continuous models and their solution via discrete processes; Vector spaces, basis, dimension, eigenvalue problems, diagonalization, inner products, unitary matrices; Introduction to applied statistics and its application to intelligent systems; Introduction to supervised statistical learning including discrimination methods.

**01267007      ADVANCED ENGINEERING MATHEMATICS      3 (3-0-6) Credits**  
Mathematics for solving engineering problems; ordinary differential equations of higher order; partial differential equations; integral equations; numerical analysis; optimization techniques.

## **Elective Courses**

**01267101      AUTOMOTIVE STRUCTURAL SYSTEM                      3 (3-0-6) Credits**  
**ENGINEERING**

Overview on vehicle research and development is including vehicle planning and design, process from advanced research to marketing, the past and the future prospect. Vehicle components are including propulsion, engine, body and suspension. Vehicle characteristics are including performance of man-machine-environment system, active safety and passive safety. Suspension and drive-train systems are including suspension system, steering system, tire and its interaction with road surface, braking system, friction and tribology, drive-train, stability and maneuverability analysis and advanced Control system. Mechanics of thin-walled Structures for automobiles is including concept of stiffness and strength for automotive structures, fundamentals of solid mechanics deformations of tension, compression and torsion, measurement of structural deformation, theory of thin plates, theory of monocoque structures, theory of structural collision and concept of impact energy absorption

**01267102      AUTOMOTIVE COMFORT MECHANICS                      3 (3-0-6) Credits**  
**ENGINEERING**

Electronics and control engineering is including introduction of electronics and control in automobiles, electric control of engines and transmission, electronics in operation monitoring, electric control in braking systems and electric control systems for automotive mobility and safety. Aerodynamics and air conditioning is including fundamentals of fluid-dynamics, computational fluid dynamics (CFD), aerodynamics in vehicles, thermodynamics in air-conditioners and air-conditioning systems in vehicles. Vibration and noise engineering is including introduction of automotive vibration and noise problems measurement and data processing for vibration and noise, modelling for vibration and noise analysis, and comfortability, numerical simulation of vibration and noise and structural design and technology for vibration and noise reduction

**01267103      COMBUSTION ENGINEERING    3 (3-0-6) Credits**

Fundamentals of combustion are including reactive gas dynamics (laminar and turbulent flames), ignition and extinction reaction kinetics and simulation. Thermodynamics in internal combustion engines are including first and second laws of thermodynamics in internal combustion engines, gas cycles of internal combustion engines and thermodynamic analysis of heat release rate in internal combustion engines. Combustion technologies in internal combustion engines are including combustion technologies in spark ignition engine, combustion technologies in compression ignition engine and combustion technologies for high efficiency and clean exhaust gas

**01267104      ADVANCED INTERNAL COMBUSTION ENGINE                      3 (3-0-6) Credits**  
**ENGINEERING AND FUTURE POWER TRAIN**

Flow and combustion diagnostics in IC engines are including flow diagnostics in IC engines and combustion diagnostics in IC engines. Zero emission technologies are including production and control of NO<sub>x</sub>, production and control of particulate matters and advanced zero emission technologies. Future power train for sustainable community is including energy consumption and environmental protection (Present status in South-East Asia and World), future energy systems for sustainability, present status and future prospect of sustainable mobility, battery electrical vehicle, hybrid vehicle and fuel cell vehicle.

**01267105      ADVANCED PRODUCTION ENGINEERING      3 (3-0-6) Credits**

Fundamentals of production technology are including production processes for automotive engineering, integrated and intelligent manufacturing system, structure and function of machine tools, computer numerical control of machine tools and practical training of CAD/CAM and CNC machine tools. Welding and joining technologies are including physics and basic engineering in welding and joining, welding and joining processes, equipments for welding and joining, behavior of materials in welding and joining, design and construction of joints, analyses of joints and examples of welding and joining process. Quality management and production planning are including problem solving using SQC tools, process control, quality design by experimental study, reliability engineering, scheduling methods and inventory control

**01267106      ALTERNATIVE VEHICLE PROPULSION SYSTEMS      3 (3-0-6) Credits**

The objective of this course is alternative concepts for vehicle power trains. These lectures deal with the different alternative drive systems, such as unconventional types of combustion engines with the consideration of alternative fuels (alcohol, natural gas, hydrogen, bi-fuel, dual fuel), gas turbines, stirling engines and fuel cells as well as electric drives. Furthermore these lectures discuss the different types of variable transmissions and power split drive trains.

**01267107      VEHICLE ACOUSTICS      3 (3-0-6) Credits**

The first part of the course deals with the physical and audiological groundings of automotive acoustics. Further subjects are noise emission standards and measurement regulations and procedures. Based on that the specific vehicle noise sources e.g. power train, brakes and tyres are discussed as far as noise generation and technical reduction potentials are concerned. The influences of manufacturer, customer and legislation on the reduction of traffic noise are investigated for the current traffic situation. Beyond the theoretical background the subjects are put into practice by demonstrations of measurement techniques, noise reduced vehicle parts and sound level measurements in the anechoic chamber or on the test track.

**01267108      MECHATRONIC SYSTEMS IN AUTOMOTIVE      3 (3-0-6) Credits**  
**ENGINEERING**

Mechatronics is an artificially built synonym for the combination of the three disciplines mechanics, electronics and computer science. A typical mechatronical system differs to classical built up systems by a higher number of elements (complexity) which are realized by the teamwork of different engineering disciplines(heterogeneous). Inside modern vehicles there were a lot of new systems appearing during the last years. Such systems like ABS, Airbag and the other mechatronical devices are more powerful than ordinary systems. The main chapters of the course are introduction in the new area of mechatronical systems and the peculiarity of its design process, basics of system and controls, capturing and processing of signals, sensors and actuators, principle and their use in vehicle engineering, simulation and modeling, mechatronical systems on rail and road.

**01267109      CURRENT TOPICS IN AUTOMOTIVE      3 (3-0-6) Credits**  
**ENGINEERING**

Topics of current interest for the field of automotive engineering which changes rapidly.

