**Birla Institute of Technology & Science, Pilani**

**Work Integrated Learning Programmes Division**

## **M.Tech. Automotive Engineering**

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| **Course Title** | Automotive Security |
| **Course No(s)** | AE ZG519 |
| **Credit Units** | 4 |
| **Credit Model** |  |
| **Instructor-In-Charge** |  |
| **Version Number** | 2.0 |
| **Date** | 25-07-2020 |

**Course Objectives:**

* Introduce the Automotive communication systems and associated threats
* Help engineers to understand the AUTOSAR standards, Vulnerabilities and secure software development
* Impart the knowledge about the threat modelling techniques and apply them to connected cars

**Text Book(s):**

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| --- | --- |
| **T1** | Automotive Cybersecurity: Issues & Vulnerabilities, Transportation Issues, Policies and R&D, Craig Martin Gibbs |
| **T2** | Automotive Cybersecurity: Issues & Vulnerabilities, Transportation Issues, Policies and R&D, Craig Martin Gibbs |

**Reference Book(s) & other resources:**

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| --- | --- |
| **R1** | Guide to Automotive Connectivity and Cybersecurity; Trends, Technologies, Innovations and Applications, Dietmar P.F. Moller, Roland E. Haas. |

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| **LEARNING OUTCOMES** | |
| **LO1** | Understand the basics of Automotive cybersecurity. |
| **LO2** | Realize the need for secure communications. |
| **LO3** | Develop strategies to prevent cyberattacks. |
| **LO4** | Design Connected cars with reduced risks of cyberattack. |

**Experiential Learning Components:**

1. **Lab:** Remote Lab
2. Case study: None
3. Work integrated Learning Exercise: None.
4. Design work/Field work: None.

**Content Structure:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Contact Hour** | **List of Topic Title** | **Sub-Topics** | **Reference** |
| 1-5 | Automotive Networks | * Networks & Protocols * K-line, CAN, LIN, FlexRAY, MOST * Architecture Implementation * Behavorial simulation | Lecture Slides |
| 5-10 | Connected CAN | * Architecture & system overview * Exposure and threat matrix- Implementation strategy, Standards * Risk profile assessment | Lecture Slides |
| 11-15 | AUTOSAR | * Organization structure * Software architecture * Security features; CAM, CAL, SECOC | Lecture Slides |
| 16-20 | Threat Modelling Technique | * Introduction- Definition, Vulnerability, Threat and Risk, TARA, Architecture, Attack class * Infosec Triad- Plus confidentiality, Integrity, Availability, Non-repudiation * Info sec Governance standards, roles and responsibilities, ongoing monitoring, overnight and value | Lecture Slides |
| 21-25 | Secure software development | * Scale and scope of problem * Software quality assurance and testing * Continuous integration * Third Party code * Overflows, Data protection * Cryptography * Embedded security | Lecture Slides |
| 26-32 | Threat Modelling of connected cars | * TARA * Adaptations * Threat agent attributes * Vulnerability analysis | Lecture Slides |

**Project Activity/ Experiential Lab:**

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| --- | --- | --- |
| **Sr No** | **Lab Details/ Project Details** | **Access** |
| 01 | Remote Lab: using Physical equipment |  |

**Evaluation Scheme:**

**Legend:** EC = Evaluation Component; AN = After Noon Session; FN = Fore Noon Session

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Evaluation Component | Name  (Quiz, Lab, Project, Mid-term exam, End semester exam, etc.) | Type (Open book, Closed book, Online, etc.) | Weight | Duration | Day, Date, Session, Time |
| EC - 1 | Theory Quiz/Assignment | Online | 10% |  |  |
|  | Lab assignment/viva | Online | 20% |  |  |
| EC - 2 | Mid-Semester Test | Closed Book | 30% | 2 hours |  |
| EC - 3 | Comprehensive Exam | Open Book | 40% | 3 hours |  |

Syllabus for Mid-Semester Test (Closed Book): Topics in Contact Hours: 1 to 16

Syllabus for Comprehensive Exam (Open Book): All topics

Important links and information:

Elearn portal: https://elearn.bits-pilani.ac.in

Students are expected to visit the Elearn portal on a regular basis and stay up to date with the latest announcements and deadlines.

Contact sessions: Students should attend the online lectures as per the schedule provided on the Elearn portal.

Evaluation Guidelines:

1. EC-1 consists a Quiz/Assignment/Project. Announcements will be made on the portal, in a timely manner.
2. For Closed Book tests: No books or reference material of any kind will be permitted.
3. For Open Book exams: Use of books and any printed / written reference material (filed or bound) is permitted. However, loose sheets of paper will not be allowed. Use of calculators is permitted in all exams. Laptops/Mobiles of any kind are not allowed. Exchange of any material is not allowed.
4. If a student is unable to appear for the Regular Test/Exam due to genuine exigencies, the student should follow the procedure to apply for the Make-Up Test/Exam which will be made available on the Elearn portal. The Make-Up Test/Exam will be conducted only at selected exam centres on the dates to be announced later.

It shall be the responsibility of the individual student to be regular in maintaining the self-study schedule as given in the course handout, attend the online lectures, and take all the prescribed evaluation components such as Assignment, Mid-Semester Test and Comprehensive Exam according to the evaluation scheme provided in the handout.

**Instructor-in-charge**

(AE ZG519)