

- LIST OF COURSES ABROAD -

Student Name: Thibault
First Name: Lebec
University abroad / Country: Manipal University Jaipur
Major: B tech Program Automobile Engineering
Current Year (at ESTACA): 4A
Type of Programme abroad (semester, master...): Semester

For each course of study: please indicate reference/code, level (undergraduate/graduate), course title, short description and the number of local/ECTS credits:

N.B. : Please indicate if only a Project is available.:

Reference	Name	Description	Level	Language	Credits
AU1602	Automotive Electrical Systems	(Description below)	undergraduate	English	4
AU1630	CAD/ CAM lab	Exercises on geometric modelling of automotive components using CATIA, CAM using CATIA.	undergraduate	English	2
AU1660	Program Elective III : Computer Aided Design & FEA	(Description below)	undergraduate	English	3
AU1657	Program Elective II : Product Design and Development	(Description below)	undergraduate	English	4
ME1696	Open Elective III : Optimization in Engineering	(Description below)	undergraduate	English	3

Total number of credits: 16

{30 credits ECTS for a semester in Europe

12 local credits for a semester in Canada if (at least) 1 course at Master level is selected - otherwise 15 credits are required

12 local credits in India, South Korea, and the U.S.A

48 local credits in Mexico

9 credits in Thailand

11 credits in China

...

Les cours de langues non obligatoires ne seront pas pris en compte dans le décompte des ECTS. Les cours obligatoires seront reconnus à hauteur de 3 ECTS maximum. Only mandatory language courses will be recognized by ESTACA school with a 3 ECTS recognition.

BATTERIES: -- Different types of batteries, Characteristics, rating, capacity and efficiency of different batteries. Battery charging methods. Battery Diagnosis using various tests. Maintenance and troubleshooting. Applications- SLI, EVs and Large Scale Energy Storage. **STARTING SYSTEM:-** Condition of starting behavior of starter during starting. Starter motor and its characteristics. Principle & construction of starter motor. Working of different starter drive units. Starter circuit, Care & maintenance of starter motor, Modern Starting system- Integrated Starter Generator. **CHARGING SYSTEM:-** Alternator- operating principle, charging circuit, characteristics curves, design. Components of DC and AC Charging System for vehicle, charging circuit, controls – cut out, relays, voltage and current regulators. Fast Charging, Ultra-Fast charging systems. Charging system maintenance & troubleshooting. **IGNITION SYSTEM** Types, construction & working of battery coil and magneto ignition systems. Centrifugal and vacuum advance mechanisms. Types and construction of spark plugs, Electronic Ignition system. Digital ignition system. Maintenance and troubleshooting **LIGHTING SYSTEM & ACCESSORIES:-** Vehicle earthing & insulation, earthing methods. Positive & negative earth systems Electrical circuits, symbols & diagrams & protection, electrical safety procedures. Wire Harness & connectors. Details of headlights, sidelight. Head light dazzling & preventive methods. Electrical fuel-pump, Digital display of information & warnings, Speedometer, Fuel, oil & temperature gauges, Horn, Wiper system, Fault Diagnosis & troubleshooting

Lab: Use of electrical and electronic testing & measurement equipment digital multimeter (volt meters, ammeters, ohmmeters, etc) battery testing equipment, cell discharge tester, hydrometer Testing, servicing, charging, present state of charge of batteries, in-vehicle & outside. Battery Monitoring System with Data Loggers Testing, servicing, dismantling, assembly, inspection of Alternator, generator, starter motor. Electrical wiring diagrams, connectors, fuses, electrical load calculations, identification and replacement of faulty components Repair, servicing or replacement of condition monitoring trip counters, visual displays, Electronic ignition systems, direct ignition spark plugs, electronic fuel control, electronic diesel fuel injection, electronic control of carburetion, electronic petrol fuel injection, **Computer based diagnostic equipment:** Use of On Board Diagnostic kit for scanning ECU, data scanners, test lights, test LEDs, pulse generators etc.

AU1657

PRODUCT DESIGN AND DEVELOPMENT

[3 0 2 4]

Introduction: Design theory, design materials, human factors in design, man-machine system, applied ergonomics, characteristics of successful product development, challenges to product development. **Fatigue Considerations in Design:** Variable load, loading pattern, endurance stresses, influence of size, surface finish, notch sensitivity and stress concentration, Goodman line, Soderberg line, Design of machine members subjected to combined, steady and alternating stresses, Design for finite life, Design of Shafts under Variable Stresses **Development process and product planning:** Generic development process, Concept development, product development process flows, product planning process-Advanced Product Quality Planning, **Product specifications:** Introduction to QFD, Identify Voice of Customer (VOC) using Kano Analysis and prioritize for using QFD. Product specification, steps to establish the target specifications using QFD. **Concept generation** Concept generation, five step concept generation method, concept selection, concept screening, concept testing, and product architecture. **Product design methods:** Creative and rational, clarifying objectives - the objective tree method, establishing functions- the function analysis method, setting requirements – the performance specification method, determining characteristics using QFD, generating alternatives – morphological chart method, evaluating alternatives – the weighted objective method, improving details – the value engineering method and design strategies. **Product Lifecycle Management:** Concept of Product Life Cycle, Components / Elements of PLM, Emergence of PLM, Significance of PLM, Customer Involvement. Company's PLM vision, The PLM Strategy, Principles for PLM strategy, Preparing for the PLM strategy, Developing a PLM strategy, Strategy identification and selection, Change Management for PLM. Understand the information flow process for product lifecycle management (PLM), Product Data and Product Workflow. Identify the gaps in the information flow and devise PLM database. Collaborate with system developers and implement PLM database.

Lab: Project based on developing Kano analysis, Pugh selection criteria and QFD

Principles of Graphics: Generation and display of simple elements like line, circle, ellipse, Transformations, Translation, Rotation and Scaling, reflection, Clipping, Line, polygon, text, **Geometric Modelling:** Types and representation of curves, Analytical curves, line, ellipse, parabola, Synthetic curves, Cubic, Bezier and B-spline curves, Types and representation of surfaces, Analytic surfaces, Plane, ruled, revolution and tabulated surfaces, Synthetic surfaces, cubic, Bezier and B-spline surfaces, Types and representation of solids, Solid representation, half spaces, Boundary Representation, **Finite Element Modelling and Analysis:** Strain, displacement and Stress strain relations, General procedure of FEM, Formulation and solution of typical problems with Spring, Truss and Beam elements, Element equations, Assembly of elements, Boundary conditions and External loads, Solution of global equations, Introduction to Plane stress / strain and solid elements.

LAB:- Finite Element Analysis of Vehicle Chassis Frame by using ANSYS. Conduct front, side and rear crash impact. Conduct Drop test of vehicle model.

ME1696

Optimization in Eng

Introduction to optimization, adequate and optimum design, formulation of objective function, design constraints. Classical optimization techniques: Single variable optimization, multivariable optimization with no constraints, exhaustive search, Fibonacci method, golden selection, Random, pattern and gradient search methods, Interpolation methods: quadratic and cubic, direct root method. Multivariable unconstrained and constrained optimization: Direct search methods, descent methods, conjugate gradient method. Indirect methods, Transformation techniques, penalty function method and non-traditional optimization techniques: Genetic Algorithms, Simulated Annealing, Tabu search methods. Optimum design of machine elements: Desirable and undesirable effects, functional requirement, material and geometrical parameters, Design of simple axial, transverse loaded members for minimum cost and minimum weight.

Date : 09/01/2018

Date : 15-01-2017

Signature of Student :



Signature of Academic Advisor :

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