



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Automotive body interiors

|                                       | Course            |
|---------------------------------------|-------------------|
| Field of study                        | Year/Semester     |
| Mechanical and Automotive Engineering | 1/1               |
| Area of study (specialization)        | Profile of study  |
| Motor vehicles                        | general academic  |
| Level of study                        | Course offered in |
| Second-cycle studies                  | polish            |
| Form of study                         | Requirements      |
| full-time                             | compulsory        |

| Number of                      |                    |                     |
|--------------------------------|--------------------|---------------------|
| hours                          |                    |                     |
| Lecture                        | Laboratory classes | Other (e.g. online) |
| 15                             | 0                  | 0                   |
| Tutorials                      | Projects/seminars  |                     |
| 0                              | 0                  |                     |
| <b>Number of credit points</b> |                    |                     |
| 1                              |                    |                     |

| Lecturers  |                                      |
|--|--------------------------------------|
| Responsible for the course/lecturer:<br>D.Sc.Ph.D. (Eng) . Grzegorz Ślaski | Responsible for the course/lecturer: |
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| Prerequisites   |
|---|
| Knowledge:The student has basic knowledge in motor vehicles design, basics of machines design and basic knowledge of metal materials used in machine construction   |
| Skills:The student able to read and understand technical informations in native and international language in a rea of vehicle design. The student is able to do analyses, synthetize informations, draw conclusions, formulate and justify opinions. |
| Social competencies: Understands the need and knows the possibilities of lifelong learning.   |



### Course objective

To make students familiar with definitions of body interior, interior and exterior trims, the requirements for that parts and components, discussion of used materials, type of design and technology of manufacturing.

### Course-related learning outcomes

#### Knowledge

He has in-depth knowledge of the construction, principles of operation and classification of machines from a selected group.

Has extensive knowledge of selected departments of technical mechanics related to the selected specialization.

Has extended knowledge of modern construction materials such as carbon plastics, composites, ceramics, in terms of their construction, processing technology and applications.

#### Skills

He can develop a technical description, offer and design documentation for a complex machine from a selected group of machines.

Can program the technological process of manufacturing machine parts, including the development of a simple program to control the machine tool.

He can correctly select the optimal material and its processing technology for typical parts of working machines, taking into account the latest achievements in material engineering.

#### Social competences

It is ready to initiate actions for the public interest.

It is ready to fulfill social obligations, inspire and organize activities for the benefit of the social environment.

Is ready to recognize the importance of knowledge in solving cognitive and practical problems and to consult experts in case of difficulties in solving the problem on its own.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Written test, which is based on answers related to the selection of given answers and open questions.

Credits will be given after achieving at least 50% of points. Answers are scores from 0 to 1 point.

### Programme content

1. Definitions, requirements and review of interior and exterior trims and components. The structure of sub-suppliers for the manufacturing of automotive interiors.
2. Materials used for the manufacturing interior parts - plastics - types and classification, characteristics of the most commonly used plastics (polyethylene, polypropylene, polyvinyl chloride, polyamide,



polyurethane, ABS, polycarbonate, plastic molding methods (injection molding, extrusion, pressing). Ecological aspects of manufacturing plastic interior and exterior elements, use of natural fibers, wood and polymer composites containing wood.

3. Cockpit - dashboard, center console, functions (aesthetics, functionality, safety), evolution of dashboards, design and technological aspects (parts manufacturing costs, quality, assembly costs), structural and unstructural cockpits, components of the dashboard, manufacturing technologies of dashboards - rigid, coated and foamed, examples of dashboard solutions and their manufacturers, bus dashboards, controls and indicators used in dashboards, analog, digital and virtual indicators.

4. Steering wheel - requirements for steering wheels, types of steering wheels, steering wheel components - functions and used design solutions - frame, rim, body, sound signal switch, airbag module, multifunction steering wheel, ergonomics of steering wheel and its adjustments, materials and technologies used for steering wheels manufacturing.

5. Seats - breakdown of seat types, functional requirements, factors affecting the feeling of seat comfort - vehicle packaging, social and individual factors, design features, static comfort (ergonomics in seat design - seating ergonomics, unit pressure), dynamic comfort (vibration perception, SEAT index, thermal comfort, sensorial comfort, weight aspect in seat design, historical evolution and currently used seat designs, mechanical structures, ranges and mechanisms of adjustment, control of seat adjustment mechanisms, technologies of car seats manufacturing.

6. Internal linings - headliners and carpets, pillars and door panels, sound absorbing materials, sun visors and mirrors. Door upholstery, interior door mechanisms - locks, power window systems. External equipment - bumpers, front grill covers, decorative elements, spoilers, lid and door seals, glass seals. Car windows.

7. Heating, ventilation and air-conditioning system - requirements, system architecture and applied technical solutions, air distribution elements, control.

### Teaching methods

1. Lecture with a multimedia presentation - a combination of an information and problem lecture;

### Bibliography

Basic

1. Zieliński A.: Konstrukcja nadwozi samochodów osobowych I pochodnych, WKiŁ, 2008

2. Morello L., Rossini L. R., Pia G., Tonoli A.: The Automotive Body, Volume I: Components Design, Springer 2011

3. Morello L., Rossini L. R., Pia G., Tonoli A.: The Automotive Body, Volume II: System Design, Springer 2011



4. Michael F. Ashby, Materials Selection in Mechanical Design, Butterworth-Heinemann, Third Edition 2005

Additional

1. Shishoo R. : Textile advances in the automotive industry, CRC Press, Woodhead Publishing Ltd, Cambridge, 2008

2. Frąc W. , Krywult B.: Projektowanie i wytwarzanie elementów z tworzyw sztucznych, Oficyna Wydawnicza Politechniki Rzeszowskiej, Rzeszów, 2008,

3. Bosch Automotive Handbook 8th edition, Bentley Publishers, 2010,

4. Safety, Comfort and Convenience Systems, Robert Bosch GmbH, 2006,

5. Dobrzański Leszek A., Materiały inżynierskie i projektowanie materiałowe. Podstawy nauki o materiałach i metaloznawstwo, Wydawnictwo PWN-WNT, 2006

**Breakdown of average student's workload**

|   | Hours | ECTS |
|---|-------|------|
| Total workload  | 25    | 1,0  |
| Classes requiring direct contact with the teacher   | 15    | 0,5  |
| Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup> | 10    | 0,5  |

<sup>1</sup> delete or add other activities as appropriate