



Module name: Composite structures and their applications

Academic year: 2013/2014 Code: RMS-1-711-s ECTS credits: 2

Faculty of: Mechanical Engineering and Robotics

Field of study: Mechatronics with English as instruction language Specialty: —

Study level: First-cycle studies Form and type of study: Full-time studies

Lecture language: English Profile of education: Academic (A) Semester: 7

Course homepage: —

Responsible teacher: dr hab. inż. Młyniec Andrzej (mlyniec@agh.edu.pl)

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Description of learning outcomes for module

MLO code	Student after module completion has the knowledge/ knows how to/is able to	Connections with FLO	Method of learning outcomes verification (form of completion)
Social competence			
M_K001	is able to create priority list during project development	MS1A_K04, MS1A_K05	Participation in a discussion, Execution of exercises, Involvement in teamwork
M_K002	is able to estimate influence of design on manufacturing costs and environmental pollution	MS1A_K05, MS1A_K02	Activity during classes, Execution of exercises
Skills			
M_U001	The student is able to select appropriate composite material meeting customer requirement using material database	MS1A_U01, MS1A_U13	Case study, Participation in a discussion, Execution of exercises
M_U002	is able to design properly the composite structure taking into account manufacturing technology and costs of production	MS1A_U01, MS1A_U13, MS1A_U20, MS1A_U12, MS1A_U03	Activity during classes, Execution of exercises
M_U003	is able to perform strength analysis of composite structure and to analyze obtained results	MS1A_U01, MS1A_U08, MS1A_U07, MS1A_U09	Activity during classes, Test, Execution of exercises
Knowledge			

M_W001	The student is familiar with the types of composites, their properties and application in industry	MS1A_W08, MS1A_W03, MS1A_W15	Activity during classes, Test, Execution of exercises
M_W002	knows and understands the methodology for designing and manufacturing of composite structures, advantages and disadvantages of different composite materials	MS1A_W12, MS1A_W17	Activity during classes, Test, Participation in a discussion, Execution of exercises
M_W003	is familiar with CAD/CAE(FEA) software	MS1A_W12	Activity during classes, Test, Execution of laboratory classes
M_W004	knows and understands the methodology of composite part designing		Activity during classes, Test

FLO matrix in relation to forms of classes

MLO code	Student after module completion has the knowledge/ knows how to/is able to	Form of classes										
		Lectures	Auditorium classes	Laboratory classes	Project classes	Conversation seminar	Seminar classes	Practical classes	Others	Fieldwork classes	Workshops	E-learning
Social competence												
M_K001	is able to create priority list during project development	-	-	+	-	-	-	-	-	-	-	-
M_K002	is able to estimate influence of design on manufacturing costs and environmental pollution	-	-	+	-	-	-	-	-	-	-	-
Skills												
M_U001	The student is able to select appropriate composite material meeting customer requirement using material database	-	-	+	-	-	-	-	-	-	-	-
M_U002	is able to design properly the composite structure taking into account manufacturing technology and costs of production	-	-	+	-	-	-	-	-	-	-	-
M_U003	is able to perform strength analysis of composite structure and to analyze obtained results	-	-	+	-	-	-	-	-	-	-	-
Knowledge												

M_W001	The student is familiar with the types of composites, their properties and application in industry	+	-	-	-	-	-	-	-	-	-	-
M_W002	knows and understands the methodology for designing and manufacturing of composite structures, advantages and disadvantages of different composite materials	+	-	-	-	-	-	-	-	-	-	-
M_W003	is familiar with CAD/CAE(FEA) software	+	-	-	-	-	-	-	-	-	-	-
M_W004	knows and understands the methodology of composite part designing	+	-	-	-	-	-	-	-	-	-	-

Module content

Lectures

Composites in automotive industry

Composites in aviation

Materials on matrices

Reinforcing fibres

Manufacturing of composites

Composite materials properties

Introduction. Composite materials and their classification.

Composites in onstruction and other industries

Strength of composite structures

Modelling of the composite structures in Finte Element Method

Laboratory classes

Composite buckling simulation

FE Analysis of composite structures

Material selection

Manufacturing process selection

Manufacturability of composite structures

Composite layup

Modelling of the composite properties

Analysis of composite strength

Seminar classes

Method of calculating the final grade

Weighted mean from laboratory exercises and tests grades

Prerequisites and additional requirements

Basic knowledge of organic chemistry and materials
Knowledge of the matrix notation
Knowledge of the strength of materials e.g. failure criteria
Model creation in CAD software

Recommended literature and teaching resources

Żuchowska D., Polimery Konstrukcyjne, Wydawnictwo Naukowo-Techniczne, Warszawa 1995
Ward I. M., Sweeney J., An introduction to the mechanical properties of solid polymers, Willey 2005
Tsai S. W., Strength and Life of Composites, CDG Stanford University 2008
Muc A., Projektowanie kompozytowych zbiorników ciśnieniowych, Wydawnictwo Politechniki Krakowskiej 1999
Boczkowska A., Kompozyty, Warszawa, Oficyna Wydawnicza Politechniki Warszawskiej 2005
Wilczyński A. P.: Polimerowe kompozyty włókniste. Warszawa, Wydawnictwo Naukowo-Techniczne 1996

Scientific publications of module course instructors related to the topic of the module

Additional scientific publications not specified

Additional information

None

Student workload (ECTS credits balance)

Student activity form	Student workload
Preparation for classes	5 h
Participation in lectures	15 h
Participation in laboratory classes	30 h
Realization of independently performed tasks	10 h
Summary student workload	60 h
Module ECTS credits	2 ECTS