Transilvania University of Brașov
INTERDISCIPLINARY DOCTORAL SCHOOL

**ADMISSION TO DOCTORAL STUDIES** **Session September 2026**

**Field of doctoral studies: Mechanical Engineering**
**Doctoral supervisor: Prof. Dr. Eng. Camelia Cerbu**

## TOPICS FOR THE ADMISSION TO DOCTORAL STUDIES

**TOPIC 1:** *Research on the stress concentrators in laminated composite materials.*

**Contents / Main aspects to be considered**

- analytical models for calculating stresses and deformations in elements such as plates or shells made of composite materials;
- finite element analysis of stress and strain fields in laminated composite material structures;
- optical analysis of strains by digital image correlation method, in laminated composite materials.

**Recommended bibliography:**


1. Barbero E. J., Finite element analysis of composite materials, CRC Press Taylor & Francis Group, ISBN -13: 978-1-4200-5434-0, Boca Raton, 2008;
2. Cerbu Camelia, Curtu I., Mecanica şi rezistența materialelor compozite, Editura Universității Transilvania din Braşov, ISBN 978-973-598-614-8, 2009, format B5, 264 pagini;
3. Chiriacescu S. T., Balcu I., Introducere în teoria elasticității şi rezistența materialelor, Editura Universității Transilvania din Braşov, 2008, ISBN 978-973-598-244-7;
4. Năstăsescu V., Bârsan Gh. Elasticitate și plasticitate. Capitole speciale, Editura Academiei Forțelor Terestre „Nicolae Bălcescu", Sibiu, 2021;
5. Hadăr A., Structuri din compozite stratificate - Metode, algoritmi şi programe de calcul, Editura Academiei Române, Bucureşti, 2002;
6. Tenek L.T., Argyris J. Finite element analysis for composite structures. Kluwer Academic Publishers, 1998, ISBN 0-7923-4899-0;
7. Vlase, S., Teodorescu, H., Purcărea, R., Modrea, A., Mecanica materialelor compozite armate cu fibre, Editura Infomarket, 2008. ISBN 978-973-8204-98-0.


**Prerequisites / Remarks:**

- *knowledge of the fundamental concepts and calculation methods from the disciplines Strength of Materials and Theory of elasticity;*
- *knowledge of the basic concepts regarding the mechanics of the laminated fiber-reinforced composite materials.*

☒ **Scientific Doctorate**
☒ **Professional Doctorate**

☒ **without tuition fee (state budget funded)**
☒ **with tuition fee or with funding from other sources than the state budget**

**TOPIC 2:** *Research regarding the effects of the environmental factors on the mechanical behaviour of the composite material structures.*

**Contents / Main aspects to be considered:**

- analytical calculation models for stress and strain states caused by temperature variations in composite structures;
- finite element analysis of stress and strain states in composite structures mechanically loaded under the action of the temperature variation;
- moisture effects on the mechanical behaviour of the composite materials;
- mechanical testing of structures and parts made of laminated composite materials.

**Recommended bibliography:**


1. Barbero E. J., Finite element analysis of composite materials, CRC Press Taylor & Francis Group, ISBN -13: 978-1-4200-5434-0, Boca Raton, 2008;
2. Cerbu Camelia, Curtu I., Mecanica şi rezistența materialelor compozite, Editura Universității Transilvania din Braşov, ISBN 978-973-598-614-8, 2009, format B5, 264 pagini;
3. Curtu I., Teoria elasticității corpurilor izotrope şi anizotrope, Universitatea Transilvania din Braşov, 2000;
4. Hadăr A., Structuri din compozite stratificate - Metode, algoritmi şi programe de calcul, Editura Academiei Române, Bucureşti, 2002;
5. Năstăsescu V., Bârsan Gh. Elasticitate și plasticitate. Capitole speciale, Editura Academiei Forțelor Terestre „Nicolae Bălcescu", Sibiu, 2021;
6. Springer G. S., Environmental Effects, Environmental Effects on Composite Materials, vol. 3, Editor Springer, G ., S., Lancaster, PA: Technomic Publishing Company, 1988;
7. Tenek L.T., Argyris J. Finite element analysis for composite structures. Kluwer Academic Publishers, 1998, ISBN 0-7923-4899-0;
8. Vlase, S., Teodorescu, H., Purcărea, R., Modrea, A., Mecanica materialelor compozite armate cu fibre, Editura Infomarket, 2008. ISBN 978-973-8204-98-0.


**Prerequisites / Remarks:**

- *knowledge of the fundamental concepts and calculation methods from Strength of Materials and Theory of elasticity;*
- *knowledge of the basic concepts about mechanics of the laminated composite materials reinforced with fibres.*

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☐ **Professional Doctorate**

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**TOPIC 3:** *Contributions on the factors influencing the mechanical behavior of 3D printed materials.*

**Contents / Main aspects to be considered**

- analytical models for calculating stresses and deformations in elements such as plates or shells;
- finite element analysis of stress and strain fields;
- mechanical testing of 3D printed composite material specimens and optical analysis of strains by digital image correlation method.

**Recommended bibliography:**


1. Barbero E. J., Finite element analysis of composite materials, CRC Press Taylor & Francis Group, ISBN -13: 978-1-4200-5434-0, Boca Raton, 2008;
2. Cerbu Camelia, Curtu I., Mecanica şi rezistența materialelor compozite, Editura Universității Transilvania din Braşov, ISBN 978-973-598-614-8, 2009, format B5, 264 pagini;
3. Chiriacescu S. T., Balcu I., Introducere în teoria elasticității şi rezistența materialelor, Editura Universității Transilvania din Braşov, 2008, ISBN 978-973-598-244-7;
4. Năstăsescu V., Bârsan Gh. Elasticitate și plasticitate. Capitole speciale, Editura Academiei Forțelor Terestre „Nicolae Bălcescu", Sibiu, 2021;
5. Hadăr A., Structuri din compozite stratificate - Metode, algoritmi şi programe de calcul, Editura Academiei Române, Bucureşti, 2002;
6. Tenek L.T., Argyris J. Finite element analysis for composite structures. Kluwer Academic Publishers, 1998, ISBN 0-7923-4899-0.


**Prerequisites / Remarks:**

- *knowledge of the fundamental concepts and calculation methods from the disciplines Strength of Materials and Theory of elasticity;*
- *knowledge of the basic concepts regarding the mechanics of the fiber-reinforced composite materials.*

☒ **Scientific Doctorate**

☐ **Professional Doctorate**

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**Doctoral supervisor,**

Prof. Dr. Eng. Camelia CERBU

Signature

**Coordinator of the field of doctoral studies,**

Prof. Dr. Eng. Maria Luminița SCUTARU

Signature