



SUBJECT DATASHEET

I. SUBJECT DESCRIPTION

1. GENERAL DATA

1.1. *Subject name (in Hungarian, in English)*

Bar structures • Beam Structures

1.2. *Neptun code*

BMEGEMMNWBS

1.3. *Type*

study unit with contact hours

1.4. *Course types and number of hours (weekly / semester)*

course type	number of hours (weekly)	nature (connected / stand-alone)
lecture (theory)	1	-
exercise	1	individual
laboratory exercise	-	-

1.5. *Type of assessments (quality evaluation)*

exam

1.6. *ECTS*

3

1.7. *Subject coordinator*

name: Dr. Szekrényes András
post: university professor
contact: szeki@mm.bme.hu

1.8. *Host organization*

Department of Applied Mechanics (<http://www.mm.bme.hu/>)

1.9. *Course homepage*

<http://www.mm.bme.hu/targyak/?BMEGEMMNWBS>

1.10. *Course language*

english

1.11. *Primary curriculum type*

mandatory elective

1.12. *Direct prerequisites*

Strong prerequisite:	-
Weak prerequisite:	-
Parallel prerequisite:	-
Milestone prerequisite:	-
Excluding condition:	BMEGEMMMW09

(the subject cannot be taken if you have previously completed any of the following subjects or groups of subjects)

2. AIMS AND ACHIEVEMENTS

2.1. Aim

The aim of the course is to give a comprehensive knowledge of the most important chapters of thin-walled sections and beams and bars: Free twisting of prismatic bars; Warping of thin sections; Inhibited twist theory; Shearing of prismatic rods; Shear center calculation; Nonlinear bending of bars; Geometric nonlinearity; Models of sandwich bars. The course also covers the theoretical and practical issues of simple engineering solutions. The aim is to provide students with a solid foundation in the tasks related to modeling and nonlinear calculations of open and closed section beams.

2.2. Learning outcomes

Competences that can be acquired by completing the course:

A. Knowledge

- He has a comprehensive knowledge of thin section modeling and calculation methods.
- He is in possession of the major chapters of the theory of strength and resilience.
- It distinguishes between free and inhibited twisting of prismatic rods.
- He is aware of the physical meaning of different approximation models.
- Understands the basic equations used to describe equilibrium.
- Understands the concept of shear center and its different calculation methods.
- He is familiar with the basic laws and mechanics of mechanics.
- Knows the theoretical foundations of geometric nonlinearity.
- It distinguishes between linear and nonlinear solution methods.
- Includes various models of sandwich bars in the system.

B. Ability

- Calculates the shear center of different sections using the spectral function.
- Use the basic elasticity equations in the calculation.
- Calculates the warpage of sections from the sector function.
- Able to distinguish between exact and engineering solutions.
- Calculates the sliding stresses along the centerline of the sheared sections.
- Apply basic methods of matrix and vector algebra.
- He interprets the principles of mechanics for thin-walled structures.
- Defines the curved shapes of nonlinearly bent bars.
- Improves your knowledge of mathematical calculations.
- Use the simplest sandwich bar models.

C. Attitude

- He constantly monitors his work, results and conclusions.
- It expands your knowledge of thin-walled structures through continuous acquisition of knowledge.
- Open to the use of information technology tools.

- It seeks to learn about and use novel theories of mechanics.
- It develops your ability to provide accurate and error-free problem solving, engineering precision and accuracy.

D. Independence and responsibility

- Collaborates with the instructor and fellow students to expand knowledge.
- Accepts well-founded professional and other critical remarks.
- In some situations, as part of a team, you work with your fellow students to solve tasks.
- With his knowledge, he makes a responsible, well-founded decision based on his analyzes.
- He feels a responsibility to educate the mechanics of the future and to future generations.

2.3. Teaching methodology

The subject consists of theoretical and practical courses of the same size. Numerical examples solved in the exercises help to understand the theoretical materials presented in the lecture. During the lecture, the most important parts of the material are conducted on a board in order for the joint work to help the students understand the curriculum. The animations and examples projected on the theoretical courses further help to master the curriculum. The materials used in the lectures and exercises can be downloaded by the students. During the semester, several minor diligent homework assignments provide students with extra points. We provide regular consultations during the semester.

2.4. Support materials

a) Textbooks

M. Shama. Torsion and shear stresses in ships. Springer. 2010. ISBN: 978-3-642-14632-9

LA Carlsson, GA Kardomateas. Structural and failure mechanics of sandwich composites. Springer. 2011. ISBN: 0925-0042

b) Lecture notes

There is no note available for the subject when filling in the form, its earliest publication date is 2020.

c) Online materials

<http://www.mm.bme.hu/targyak/?BMEGEMMNWBS>

2.5. Validity of the course description

Start of validity:	2019. September 1.
End of validity:	2027. July 15.

II. SUBJECT REQUIREMENT

3. ACHIEVEMENT CONTROL AND EVALUATION

3.1 General rules

Learning outcomes are assessed on the basis of two mid-year written performance measurements (two partial performance assessments). Partial performance assessment (homework): a complex way of evaluating the knowledge, ability, attitude, as well as independence and responsibility type competence elements of the subject, the form of which is the individual homework. Homework must be submitted in an orderly documented, electronic form, communicating the detailed calculation results. You need to include the right amount and quality of graphics for your homework. The documentation must be prepared independently and submitted by the deadline specified during the semester.

3.2 Assessment methods

A. Detailed description of mid-term assessments

Mid-term assessment

type: formative assessment, simple

count: 2

purpose, description: The basic aim of the partial performance assessment is to examine the existence of attitudes and learning outcomes belonging to the autonomy and responsibility competence group. The way to do this is to create two individual homework documents. The topic of the tasks is based on the parts of the material told before the publication. The content and form requirements and evaluation principles of the completed homework are clearly included in the assignment and the website of the subject. You can get up to 25 points with one task.

B. Detailed description of assessments performed during the examination period (if relevant)

Elements of the exam:

1. written partial exam

obligation: mandatory (partial) exam unit, failing the unit results in fail (1) exam result

The written part of the exam consists of the syllabus submitted during the semester. The written exam consists of two parts: a part with theoretical questions and a calculation part. In the theoretical description: part, short questions need to be answered, with amley aiming to assess whether the student is aware of the basic concepts of the subject. In the calculation part, the application of different models has to be performed and the solution quantified.

2. oral partial exam

obligation: does not apply

description:

3. practical partial exam

obligation: does not apply

description:

4. inclusion of mid-term results

obligation: mandatory (partial) exam unit, failing the unit results in fail (1) exam result

description: Two compulsory homework assignments on the subject must be completed and submitted before the deadline, each worth fifteen points. During the semester, you can also submit two diligent homework assignments, each worth five points. Two compulsory homework assignments on the subject must be completed and submitted before the deadline, each worth fifteen points. During the semester, you can also submit two diligent homework assignments, each worth five points.

3.3 The weight of mid-term assessments in signing or in final grading

identifier	weight
Mid-term assessment	100 %

The condition for signing is that the score obtained in the mid-year assessments is at least **40%**.

3.4 The weight of partial exams in grade (if relevant)

type	weight
written partial exam	50 %
oral partial exam	0 %
practical partial exam	0 %
inclusion of mid-term results	50 %

3.5 Determination of the grade

grade • [ECTS]	the grade expressed in percents
very good(5) • Excellent [A]	above 90%
very good(5) • Very Good [B]	85% .. 90%
good(4) • Good [C]	70% .. 85%
satisfactory(3) • Satisfactory [D]	56% .. 70%
sufficient(2) • Pass [E]	40% .. 56%
insufficient(1) • Fail [F]	below 40%

The lower limit specified for each grade already belongs to that grade.

3.6 Attendance and participation requirements

Must be present at at least **70%** (rounded down) of lectures.

At least **70%** the exercises (rounded down) must be actively attended.

3.7 Special rules for improving, retaken and replacement

The special rules for improving, retaken and replacement shall be interpreted and applied in conjunction with the general rules of the CoS (TVSZ).

Can the submitted and accepted partial performance assessments be resubmitted until the end of the replacement period in order to achieve better results?

NO

Taking into account the previous result in case of improvement, retaken-improvement:

new result overrides previous result

The way of retaking or improving a partial assessment for the first time:

partial assesment(s) in this group cannot be improved or repeated, the final result is assessed in accordance with Code of Studied 122. § (6)

3.8 Study work required to complete the course

Activity	hours / semester
participation in contact classes	28
mid-term preparation for practices	7
elaboration of a partial assesment task	8
exam preparation	21
additional time required to complete the subject	26
summary	90

3.9. Validity of subject requirements

Start of validity:	2019. September 1.
End of validity:	2027. July 15.

4. ADDITIONAL INFORMATION

4.1 Primary course

The primary (main) course of the subject in which it is advertised and to which the competencies are related:

Common on all MSc programmes

4.2 Link to the purpose and (special) compensations of the Regulation KKK

This course aims to improve the following competencies defined in the Regulation KKK>

a) knowledge

- Student has the knowledge of the general and specific characteristics, boundaries and main developments of the field, its links with related disciplines.
- Student has the detailed knowledge of the context, theories and terminology of the field.
- Student has a detailed knowledge of legal regulations and ethical standards relevant to the field of specialisation.

b) ability

- Student carries out a detailed analysis of the various concepts that make up the knowledge base of the field, synthesising and synthesising the broad and specific contexts and making an appropriate assessment of them.
- Student identifies specific professional problems using a multifaceted, interdisciplinary approach, and explores and formulates the detailed theoretical and practical background needed to solve them.
- Student has a high level of knowledge transfer skills in the field, and is able to use and process publication sources in Hungarian and foreign languages, and has effective information research and processing skills in the field.

c) attitude

- Student takes decisions in new, complex and strategic decision-making situations and in unexpected situations, taking full account of legal and ethical standards.
- Student strives to put the latest developments in student's field at the service of student's own development.
- Student understands and represents the active citizenship and literacy elements that define the key issues in their field.

d) independence and responsibility

- Student demonstrates a high degree of autonomy in thinking through and developing broad and specific professional issues on the basis of given resources.
- Student is involved in research and development projects, mobilises student's theoretical and practical knowledge and skills in a project team in an autonomous way, in cooperation with the other members of the team, in order to achieve the objective.
- Student independently applies a wide range of methods and techniques in practice in contexts of varying complexity and predictability.

4.3 Prerequisites for completing the course

Knowledge type competencies

(a set of prior knowledge, the existence of which is not obligatory, but greatly facilitates the successful completion of the subject) -

Ability type competencies

(a set of prior abilities and skills, the existence of which is not obligatory, but greatly contributes to the successful completion of the subject) -