

Introductory mathematical course

Introductory mathematical course									
Introductory mathematical course in calculus for students of IT, engineering, economics etc. Teaching and learning strategies implemented: Flipped classroom (FC), Instruction-based learning and Project-based learning (PBL-WBL)									
Planned ECTS: 5									
Number of learners: 200									
Mode of delivery: Blended									
Status: IN PLANNING									
Course public access: Public									
Contributors: Blaženka Divjak, Barbi Svetec, Mihaela Bosak, Damjan Klemenčič, Marija Maksimović									
Course learning outcome							Level	Weight	
Explain the concept of the derivative of a real function of one real variable and its geometric interpretation							Understanding	10	
Analyze an elementary function using derivatives and sketch its graph							Analysing	12	
Apply differential calculus to find local extrema of a function with one variable and inflection points of the function.							Applying	12	
Determine the primitive function and apply integral calculus in calculating surface area and volume.							Applying	12	
Analyze and solve a problem task in the area of mathematical analysis of the function of one variables							Analysing	10	
Create a program solution for a specific mathematical problem and present the solution in written format							Creating	16	
Explain the concept of primitive function and integrals of a function with one variable							Understanding	10	
Define elementary functions of a real variable, analyze their properties and sketch their graphs.							Analysing	10	
Explain a concept of a limit and determine standard limits of functions							Applying	8	
							Total weight: 100		
Topic / Unit name	Workload	Learning type	Mode of delivery	Groups	Collaboration	Feedback	Mandatory activity	Assessment	

										Points	Type	Providers
Introduction												
Introduction of the course and TLAs												
Introduction of the course Content, assessment and TLAs	45 min	Acquisition	Hybrid	Synchronous	Teacher present	No	No	No	No	No		
Discussion Students use discussion online and ask questions, propose ideas	60 min	Discussion	Hybrid	Asynchronous	Teacher not present	No	Yes	Peer	No	No		
Total unit workload	1.75h											

**Real
functions of
real
variables**

Analyze and solve a problem task in the area of mathematical analysis of the function of one variables **(40%)**,
Define elementary functions of a real variable, analyze their properties and sketch their graphs. **(60%)**

The domain of the function.
Composition.
Bijection. Graph of the function.

Repetition of basic concepts Students receive a pre-prepared video with which they repeat basic concepts of function and graphs of elementary functions.	30 min	Acquisition	Online	Asynchronous	Teacher not present	No	No	No	No	No		
Discussion Students participate in discussions related to the introductory video. They can ask questions that can be answered by other students or a teacher.	15 min	Discussion	Online	Asynchronous	Teacher present	No	No	Peer, Teacher	No	No		
Quiz (basic concepts) Students take a short quiz which cover the basic notions from the video.	10 min	Assessment	Online	Asynchronous	Teacher not present	No	No	Automated	No	1	Formative	Automated

<p>Lecture Professor checks how many students watched the video lesson and what the quiz results were. Based on the results of the quiz, teacher repeats concepts that are less well understood and designs lecture to upgrade and broaden the topic. Students have possibility for additional questions.</p>	120 min	Acquisition	Hybrid	Synchronous	Teacher present	No	No	No	No	No
<p>Practice Assistants work with students. During the exercises, students do standard tasks related to the topic. In a group, they solve slightly more complex tasks.</p>	90 min	Practice	Hybrid	Synchronous	Teacher present	Yes	No	Teacher, Peer	No	No
<p>Total unit workload</p>	4.41h									
<p>Properties of real functions of a real variable</p>										

Properties of real functions Students receive a pre-prepared video with which they repeat basic properties of real functions.	30 min	Acquisition	Online	Asynchronous	Teacher not present	No	No	No	No	No			
Discussion Students participate in discussions related to the introductory video. They can ask questions that can be answered by other students or a teacher.	15 min	Discussion	Online	Asynchronous	Teacher present	No	No	Peer	No	No			
Quiz (properties of real function) Students take a short quiz which cover the basic notions from the video.	10 min	Assessment	Online	Asynchronous	Teacher not present	No	No	Automated	No	1	Formative	Automated	

<p>Lecture Professor checks how many students watched the video lesson and what the quiz results were. Based on the results of the quiz, teacher repeats concepts that are less well understood and designs lecture to upgrade and broad the topic. Students have possibility for additional questions.</p>	120 min	Acquisition	Hybrid	Synchronous	Teacher present	No	No	No	No	No
<p>Practice Assistants work with students. During the exercises, students do standard tasks related to the topic. In a group, they solve slightly more complex tasks.</p>	90 min	Practice	Hybrid	Synchronous	Teacher present	Yes	No	Teacher, Peer	No	No

Independent practical work Students work independently using the material in LMS Moodle and textbook.	90 min	Practice	Onsite	Asynchronous	Teacher not present	No	Yes	Automated, Peer	No	No		
Quiz (properties of real function-math problems) Students take a short quiz which cover the basic math problems.	30 min	Assessment	Online	Asynchronous	Teacher not present	No	No	Automated	No	2	Formative	Automated
Total unit workload	6.41h											
Examples of functions and their graphs												
Examples (real functions of real variable) Students receive a pre-prepared video with which they repeat basic properties of real functions.	30 min	Acquisition	Online	Asynchronous	Teacher not present	No	No	No	No	No		
Discussion Students participate in discussions related to the introductory video.	15 min	Discussion	Online	Asynchronous	Teacher present	No	No	Peer, Teacher	No	No		

Quiz (examples) Students take a short quiz which cover the basic notions from the video.	10 min	Assessment	Online	Asynchronous	Teacher not present	No	No	Automated	No	1	Formative	Automated
Lecture Professor checks how many students watched the video lesson and what the quiz results were. Based on the results of the quiz, teacher repeats concepts that are less well understood and designs lecture to upgrade and broad the topic. Students have possibility for additional questions.	120 min	Acquisition	Hybrid	Synchronous	Teacher present	No	No	No	No	No		
Practice Assistants work with students. During the exercises, students do standard tasks related to the topic. In a group, they solve slightly more complex tasks.	90 min	Practice	Hybrid	Synchronous	Teacher present	Yes	No	Teacher, Peer	No	No		

<p>Independent practical work Students work independently using the material in LMS Moodle and textbook.</p>	90 min	Practice	Onsite	Asynchronous	Teacher not present	No	Yes	Automated, Peer	No	No
Total unit workload	5.91h									
Sequences of real numbers and their properties										
<p>Examples (real functions of real variable) Students receive a pre-prepared materials with which they repeat basic properties of sequences. Students have to independently investigate and repeat the basic concepts of arithmetic and geometric series.</p>	90 min	Investigation	Online	Asynchronous	Teacher not present	No	No	No	No	No

Lecture Teacher repeats basic concepts of sequences (definition, arithmetic and geometric sequences, properties and examples of sequences) and upgrades and broad the topic with limit of sequence.	180 min	Acquisition	Hybrid	Synchronous	Teacher present	No	No	No	No	No			
Quiz (sequences) Students take a short quiz which cover the basic notions from lecture.	10 min	Assessment	Online	Asynchronous	Teacher not present	No	No	Automated	No	1	Formative	Automated	
Practice Assistants work with students. During the exercises, students do standard tasks related to the topic. In a group, they solve slightly more complex tasks.	180 min	Practice	Hybrid	Synchronous	Teacher present	Yes	No	Teacher, Peer	No	No			

Independent practical work Students work independently using the material in LMS Moodle and textbook.	120 min	Practice	Onsite	Asynchronous	Teacher not present	No	Yes	Automated, Peer	No	No		
Quiz (sequences-math problems) Students take a short quiz which cover basic math problems.	30 min	Assessment	Online	Asynchronous	Teacher not present	No	No	Automated	No	2	Formative	Automated
Total unit workload	10.16h											

<p>Limit of functions</p> <p>Explain a concept of a limit and determine standard limits of functions (100%), Analyze an elementary function using derivatives and sketch its graph (10%), Define elementary functions of a real variable, analyze their properties and sketch their graphs. (10%)</p>											
<p>Limit of function</p>											
<p>Motivational example Students receive a pre-prepared video with motivational example for limit of function and intuitive definition.</p>	60 min	Acquisition	Online	Asynchronous	Teacher not present	No	No	No	No	No	No

<p>Lecture Professor checks how many students watched the video lesson. Professor explains basic concepts and designs lecture to upgrade and broad the topic (Heine's and Cauchy's definition of function limit, main properties and theorems with proofs, continuity of function). Students have possibility for additional questions.</p>	180 min	Acquisition	Hybrid	Synchronous	Teacher present	No	No	No	No	No		
<p>Quiz (limit of function) Students take a short quiz which cover the basic notions from lecture.</p>	15 min	Assessment	Online	Asynchronous	Teacher not present	No	No	Automated	No	1	Formative	Automated

Practice Assistants work with students. During the exercises, students do standard tasks related to the topic. In a group, they solve slightly more complex tasks.	120 min	Practice	Hybrid	Synchronous	Teacher present	No	No	No	No	No		
Independent practical work Students work independently using the material in LMS Moodle and textbook.	180 min	Practice	Onsite	Asynchronous	Teacher not present	No	Yes	Automated, Peer	No	No		
Quiz (limit of function-math problems) Students take a short quiz which cover the basic math problems.	60 min	Assessment	Online	Asynchronous	Teacher not present	No	No	Automated	No	2	Formative	Automated
Total unit workload	10.25h											

<p>Monthly test 1</p> <p>Analyze and solve a problem task in the area of mathematical analysis of the function of one variables (10%), Define elementary functions of a real variable, analyze their properties and sketch their graphs. (20%)</p>										
<p>Preparation for the test</p>										
<p>Independent practical work Students work independently</p>	200 min	Practice	Onsite	Asynchronous	Teacher not present	No	Yes	Automated, Peer	No	No
<p>Discussion about technical and content related issues Students are given information in LMS and then they can ask questions.</p>	60 min	Discussion	Online	Asynchronous	Teacher not present	No	Yes	Teacher, Peer	No	No

Total unit workload	4.33h											
Monthly test (kolokvij)												
Test The test is prepared in hybrid delivery mode using individualised assignments from the databases in LMS.	90 min	Assessment	Hybrid	Synchronous	Teacher present	No	No	Teacher, Automated	No	20	Summative	Teacher, Automated
Total unit workload	1.5h											
Analysis of the test												
Students' feedback A questionnaire with open and closed questions is used. Students give feedback to teachers (technical and content wise).	20 min	Discussion	Online	Asynchronous	Teacher not present	No	No	No	No	No		

Analysis of the test Reliability, validity, students' satisfaction survey, explaining solutions	45 min	Discussion	Hybrid	Synchronous	Teacher present	No	No	Teacher	No	No
Further student investigation Students investigate application areas of mathematics learned.	90 min	Investigation	Online	Asynchronous	Teacher not present	Yes	Yes	Peer	No	No
Total unit workload	2.58h									
The Derivative - basic concepts, techniques and rules Explain the concept of the derivative of a real function of one real variable and its geometric interpretation (90%) , Apply differential calculus to find local										

extrema of a function with one variable and inflection points of the function.
(30%), Analyze an elementary function using derivatives and sketch its graph
(20%), Define elementary functions of a real variable, analyze their properties and sketch their graphs.
(10%)

Concept and definition of the derivative

<p>Introduction of problems - motivation FC approach Video on problems that lead to the derivative: the slope of a tangent, velocity, optimization</p>	30 min	Acquisition	Online	Asynchronous	Teacher not present	No	No	No	No	No			
<p>Discussion Students participate in discussions related to the introductory video.</p>	30 min	Discussion	Online	Asynchronous	Teacher not present	No	No	Peer	No	0	Formative	Peer	
<p>Lecture - concept of derivative Professors work with students in a hybrid format on the development of the concept of the derivative, geometric interpretation and definition.</p>	60 min	Acquisition	Hybrid	Synchronous	Teacher present	No	No	No	No	No			
<p>Quiz Students take a short quiz based on the concept of the derivative.</p>	20 min	Assessment	Online	Asynchronous	Teacher present	No	No	Automated	No	1	Formative	Automated	

Practice Assistants work with students on derivatives; techniques and rules application.	90 min	Practice	Onsite	Synchronous	Teacher present	No	Yes	Teacher	No	No
Independent practical work. Students practice different differentiation techniques based on material in LMS and textbooks.	90 min	Practice	Onsite	Asynchronous	Teacher not present	No	No	Automated	No	No
Total unit workload	5.33h									
Derivatives of implicit functions, chain rule, higher-order derivatives										

Video lecture - advanced techniques Students listen to a short video on the introduction advanced techniques of differentiation and then participate in a face to face presentation by the teacher on these techniques.	60 min	Acquisition	Hybrid	Synchronous	Teacher present	No	No	No	No	No			
Quiz Students take a short quiz based on advanced techniques of differentiation.	20 min	Assessment	Online	Asynchronous	Teacher present	No	No	No	No	2	Formative	Automated	
Practice Assistants work with students on examples of derivation of implicit functions and chain rule.	90 min	Practice	Onsite	Synchronous	Teacher present	No	Yes	Teacher	No	No			

Application of derivatives

Apply differential calculus to find local extrema of a function with one variable and inflection points of the function.

(60%), Analyze an elementary function using derivatives and sketch its graph

(50%), Analyze and solve a problem task in the area of mathematical analysis of the function of one variables **(10%)**

Finding local extrema

Video-lecture - function extrema Student listen video lecture about finding the absolute (or global) minimum and maximum values of a function.	30 min	Acquisition	Online	Synchronous	Teacher not present	No	No	Teacher	No	No		
Quiz Students take a short quiz based on finding extrema of function.	20 min	Assessment	Online	Asynchronous	Teacher present	No	No	Automated	No	1	Formative	Automated
Practice Assistants work with students on finding function increasing or decrease intervals by use of local extrema.	90 min	Practice	Onsite	Synchronous	Teacher present	No	Yes	Teacher	No	No		
Independent practical work-finding extrema Students practice finding increasing or decreasing intervals based on material in LMS and textbooks.	90 min	Practice	Onsite	Asynchronous	Teacher not present	No	No	Automated	No	No		

<p>Self-assessment Students take self-assessment based on the assessment tasks in LMS (database). Based on the results they are instructed to further investigate.</p>	90 min	Investigation	Online	Asynchronous	Teacher not present	No	Yes	Teacher	No	0	Formative	Teacher
Total unit workload	5.33h											
Curvature-Concavity and convexity												
<p>Video-lecture-Concavity and convexity Student watch video lecture that explains points of inflection, and concavity and convexity of a function.</p>	25 min	Acquisition	Online	Synchronous	Teacher not present	No	No	Teacher	No	No		

<p>Independent practical work - concavity and convexity Students practice finding point of inflection based on material in LMS and textbooks.</p>	90 min	Practice	Onsite	Asynchronous	Teacher not present	No	No	Automated	No	No		
<p>Quiz Students take a short quiz about function concavity and convexity.</p>	20 min	Assessment	Online	Asynchronous	Teacher present	No	No	Automated	No	2	Formative	Automated
<p>Practice Assistants work with students on describing the shape or curvature of a curve.</p>	90 min	Practice	Onsite	Synchronous	Teacher present	No	Yes	Teacher	No	No		
<p>Self-assessment Students take self-assessment based on the assessment tasks in LMS (database). Based on the results they are instructed to further investigate.</p>	90 min	Investigation	Online	Asynchronous	Teacher not present	No	Yes	Teacher	No	0	Formative	Teacher
<p>Total unit workload</p>	5.25h											

Monthly test

2

Explain the concept of the derivative of a real function of one real variable and its geometric interpretation
(10%), Apply differential calculus to find local extrema of a function with one variable and inflection points of the function.
(10%), Analyze an elementary function using derivatives and sketch its graph
(20%)

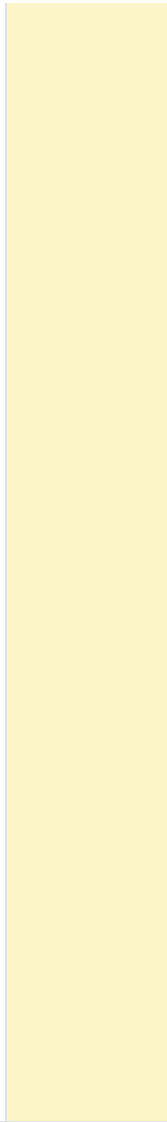
Preparation for the test

Independent practical work Students work independently	200 min	Practice	Onsite	Asynchronous	Teacher not present	No	Yes	Automated, Peer	No	No
---	---------	----------	--------	--------------	---------------------	----	-----	-----------------	----	----

<p>Discussion about technical and content related issues</p> <p>Students are given information in LMS and then they can ask questions.</p>	60 min	Discussion	Online	Asynchronous	Teacher not present	No	Yes	Teacher, Peer	No	No			
Total unit workload	4.33h												
Monthly test (kolokvij)													
<p>Test</p> <p>The test is prepared in hybrid delivery mode using individualised assignments from the databases in LMS.</p>	90 min	Assessment	Hybrid	Synchronous	Teacher present	No	No	Teacher, Automated	No	20	Summative	Teacher, Automated	
Total unit workload	1.5h												
Analysis of the test													

<p>Project team work - PEER ASSESSMENT</p> <p>Analyze and solve a problem task in the area of mathematical analysis of the function of one variables (5%), Create a program solution for a specific mathematical problem and present the solution in written format (100%)</p>											
<p>Preparation for the project</p>											
<p>Presentation of teamwork Professors and assistants present the way of working on the project, the choice of the project topic and the formation of the project team. The link of the</p>	<p>45 min</p>	<p>Discussion</p>	<p>Hybrid</p>	<p>Synchronous</p>	<p>Teacher present</p>	<p>No</p>	<p>No</p>	<p>No</p>	<p>No</p>	<p>No</p>	<p>No</p>

project assignment (PBL) with the learning outcomes is explained, and how the PBL will contribute to students' future jobs. Teachers present the initial proposal of evaluation criteria for the project. The initial criteria include: research on the theoretical background, investigation of possible methodology for a solution, problem solution, presentation of the solution, quality of teamwork. Number of students: cca 100, 3-4 per team



<p>Discussion of peer-assessment criteria Teachers and students discuss the criteria for project assessment, the level of achievement, and how to recognize the level of achievement. At the end, a rubric is finalized and hopefully understood by all the students. The initial criteria may be changed based on discussion. The levels of achievement will be described, ranging from 0 do 4 (depending on a specific criterion - some may have 2, and other 3 or 4 levels).</p>	45 min	Discussion	Hybrid	Synchronous	Teacher present	No	No	No	No	No
---	--------	------------	--------	-------------	-----------------	----	----	----	----	----

<p>Excercise peer-assessment (peer-grading) Students are supposed to peer-assess two projects (for previous years - including one better and one not-so-good) to practice how to use the LMS, criteria, and rubrics. After that, discussion about the process is performed and the criteria are clarified if necessary. Students discuss (mutually and with the teacher) the issues related to academic integrity, fair assessment and ethical issues related to cheating.</p>	90 min	Practice	Online	Asynchronous	Teacher present	No	Yes	Teacher, Automated, Peer	No	No
--	--------	----------	--------	--------------	-----------------	----	-----	--------------------------	----	----

<p>Assessment and peer-assessment (peer-grading) Students participate in peer-assessment based on the pre-defined assessment criteria and levels of achievement given in the assessment rubric in the Moodle workshop. Each student is assigned with 2 projects to assess - the distribution is done automatically in the Moodle workshop. Peer-assessment is double-blinded: students are not given information about whose work they are assessing or who is assessing their work. The final grade is calculated based on teacher assessment (higher weight) and student peer-assessment</p>	90 min	Assessment	Hybrid	Asynchronous	Teacher present	No	No	Teacher, Peer	No	20	Summative	Teacher, Peer
--	--------	------------	--------	--------------	-----------------	----	----	---------------	----	----	-----------	---------------

Integration - basic concepts, techniques and rules

Explain the concept
of primitive
function and
integrals of a
function with one
variable **(45%)**,
Determine the
primitive function
and apply integral
calculus in
calculating surface
area and volume.
(20%), Analyze
and solve a
problem task in the
area of
mathematical
analysis of the
function of one
variables **(35%)**

Concept and definition of integration												
Introduction of problems - motivation Video on problems that lead to the integral: calculating surface of area, concept of primitive function and integrals of a function (upper and lower Darboux sum).	30 min	Acquisition	Online	Asynchronous	Teacher not present	No	No	No	No	No		
Discussion Students participate in discussions related to the introductory video	15 min	Discussion	Online	Asynchronous	Teacher not present	No	No	Peer	No	0	Formative	Peer
Lecture - concept of integral Professors work with students in a hybrid format on the development of the concept of the integral, geometric interpretation and definition.	120 min	Acquisition	Hybrid	Synchronous	Teacher present	No	No	No	No	No		

Quiz Students take a short quiz based on the concept of the integral	10 min	Assessment	Online	Asynchronous	Teacher present	No	No	Automated	No	1	Formative	Automated
Total unit workload	2.91h											
Integration techniques												
Lecture - advanced techniques Professor presents advanced techniques of integration. Students can ask questions.	90 min	Acquisition	Hybrid	Synchronous	Teacher present	No	No	No	No	No		
Practice Assistants work with students on integrals; techniques and rules application.	120 min	Practice	Onsite	Synchronous	Teacher present	No	Yes	Teacher	No	No		
Independent practical work. Students learn and practice based on material in LMS and textbooks.	120 min	Practice	Onsite	Asynchronous	Teacher not present	No	No	Automated	No	No		

<p>Quiz (Integration- math problems) Students take a short quiz based on the concept of the derivative.</p>	30 min	Assessment	Online	Asynchronous	Teacher present	No	No	Automated	No	2	Formative	Automated
<p>Total unit workload</p>	6h											
<p>Application of integral calculus Explain the concept of primitive function and integrals of a function with one variable (35%), Determine the primitive function and apply integral calculus in calculating surface area and volume. (60%)</p>												
<p>Calculating surface area</p>												

Lecture - calculating surface Student listen video lecture about calculating surface area.	45 min	Acquisition	Online	Synchronous	Teacher not present	No	No	Teacher	No	No		
Quiz Students take a short quiz based on calculating surface area.	20 min	Assessment	Online	Asynchronous	Teacher present	No	No	Automated	No	1	Formative	Automated
Lecture Professor checks how many students watched the video lesson and what the quiz results were. Based on the results of the quiz, teacher repeats concepts that are less well understood and designs lecture to upgrade and broad the topic. Students have possibility for additional questions.	120 min	Acquisition	Hybrid	Synchronous	Teacher present	No	No	No	No	No		
Practice Assistants work with students on calculating surface area.	120 min	Practice	Onsite	Synchronous	Teacher present	No	Yes	Teacher	No	No		

Independent practical work-calculating surface area Students practice calculating surface area.	180 min	Practice	Onsite	Asynchronous	Teacher not present	No	No	Automated	No	No		
Self-assessment Students take self-assessment based on the assessment tasks in LMS (database).	90 min	Assessment	Online	Asynchronous	Teacher not present	No	Yes	Teacher	No	2	Formative	Teacher
Total unit workload	9.58h											
Calculating volume												
Lecture - calculating volume Student listen video lecture about calculating volume.	30 min	Acquisition	Online	Synchronous	Teacher not present	No	No	Teacher	No	No		
Quiz Students take a short quiz based on calculating volume.	20 min	Assessment	Online	Asynchronous	Teacher present	No	No	Automated	No	1	Formative	Automated

<p>Lecture Professor checks how many students watched the video lesson and what the quiz results were. Based on the results of the quiz, teacher repeats concepts that are less well understood and designs lecture to upgrade and broaden the topic. Students have possibility for additional questions.</p>	90 min	Acquisition	Hybrid	Synchronous	Teacher present	No	No	No	No	No
<p>Practice Assistants work with students on calculating volume.</p>	90 min	Practice	Onsite	Synchronous	Teacher present	No	Yes	Teacher	No	No
<p>Independent practical work-calculating volume Students practice calculating volume.</p>	120 min	Practice	Onsite	Asynchronous	Teacher not present	No	No	Automated	No	No

Self-assessment Students take self-assessment based on the assessment tasks in LMS (database).	90 min	Assessment	Online	Asynchronous	Teacher not present	No	Yes	Teacher	No	2	Formative	Teacher
Total unit workload	7.33h											
Monthly test 3 Explain the concept of primitive function and integrals of a function with one variable (20%) , Determine the primitive function and apply integral calculus in calculating surface area and volume. (20%)												
Preparation for the test												
Independent practical work Students work independently	200 min	Practice	Onsite	Asynchronous	Teacher not present	No	Yes	Automated, Peer	No	No		

<p>Discussion about technical and content related issues</p> <p>Students are given information in LMS and then they can ask questions.</p>	60 min	Discussion	Online	Asynchronous	Teacher not present	No	Yes	Teacher, Peer	No	No			
Total unit workload	4.33h												
Monthly test (kolokvij)													
<p>Test</p> <p>The test is prepared in hybrid delivery mode using individualised assignments from the databases in LMS.</p>	90 min	Assessment	Hybrid	Synchronous	Teacher present	No	No	Teacher, Automated	No	20	Summative	Teacher, Automated	
Total unit workload	1.5h												
Analysis of the test													

Students' feedback A questionnaire with open and closed questions is used. Students give feedback to teachers (technical and content wise).	20 min	Discussion	Online	Asynchronous	Teacher not present	No	No	No	No	No
Analysis of the test Reliability, validity, students' satisfaction survey, explaining solutions	45 min	Discussion	Hybrid	Synchronous	Teacher present	No	No	Teacher	No	No
Further student investigation Students investigate application areas of mathematics learned.	90 min	Investigation	Online	Asynchronous	Teacher not present	Yes	Yes	Peer	No	No
Total unit workload	2.58h									
Total course workload	138.66h									