APLIMAT 2020
19th Conference on Applied Mathematics
February 4 - 6, 2020

Aplimat 2020 Special Session
Rules_Math

New Rules for Assessing Mathematical Competencies

Date: 4-6 February, 2020

Venue: Institute of Mathematics and Physics
Faculty of Mechanical Engineering
Slovak University of Technology in Bratislava
Nám. slobody 17, 812 31 Bratislava, SLOVAKIA

Programme:

Plenary lecture **Tuesday, February 4, 2020 (Room S2)**	
08:40 – 10:30	Rules_Math Results Araceli Dios Queiruga - Assessment Standards And Activities: Some Results
New Trends In Mathematical Education At Universities - On Rules Math Project Results **Wednesday, February 5, 2020, D. Richtáriková (Room S2)**	
08:30 – 10:30	**Chairperson: Araceli Queiruga Dios**
08:30 – 08:50	Snezhana Gocheva-Ilieva, Hristina Kulina, Anton Iliev, Atanas Ivanov, Iliycho Iliev: A Model For Assessment Of Mathematical Competencies In Engineering Education
08:50 – 09:10	Deolinda Maria Lopes Rasteiro, Cristina Maria Caridade: Statistical Methods: Assessing Knowledge And Competencies
09:10 – 09:30	Cristina Maria Caridade, Deolinda Maria Lopes Rasteiro, Daniela Richtarikova: Mathematics For Engineers: Assessing Knowledge And Competencies
09:30 – 09:50	Yilmaz Fatih, Mierlus Mazilu Ion, Rasteiro Deolinda: Solving Real Life Problems Using Matrices And Determinants
09:50 – 10:10	Mierlus Mazilu Ion, Yilmaz Fatih: Some Practical Applications Of Matrices And Determinants In Real Life
10:10 – 10:30	Marie Demlova: Increasing Students' Motivation. Example From Discrete Mathematics
10:30 – 10:40	Jana Gabkova, Daniela Richtarikova, Peter Letavaj: Assessment Of Mathematical Competence Via Contents Models
Mathematics and Physics In Science and Education **Thursday, February 6, 2020, (Room S3), Leja**	
11:50 – 12:10	Petr Habala: A New Numerical Methods Library For Maple

Project: 2017-1-ES01-KA203-038491

Abstracts:

Plenary lecture

ASSESSMENT STANDARDS AND ACTIVITIES: SOME RESULTS

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Araceli Queiruga Dios obtained his Ph.D. in Mathematics at the University of Salamanca (Spain) when she was working for a telecommunications multinational company. Her major field of research is public key cryptography, together with educational tools and mathematical applications for engineering students. She is Professor at the Department of Applied Mathematics at the School of Industrial Engineering in the University of Salamanca. She has participated as coordinator and collaborator in several research projects at national and European level. She is co-author of over 50 papers, more than 70 contributions to workshops and conferences, and 1 patent related to RSA parameters. She is currently the coordinator of the Erasmus+ project: RULES_MATH (New rules for assessing mathematical competencies).

Abstract. During the last 2 years a team made of 9 European institutions have been working to define assessment standards for Mathematics in engineering degrees. Mathematics courses in engineering degrees are a challenge. Different methodologies such as team work, project-based learning, or learning by games, are daily part of our classes. The big “problem” dealing with engineering students is that they need mathematics as a tool for other disciplines. Mathematics is not a goal, but a means to become a professional. Our competencies-based learning methods take students to change their minds and discover a new educational paradigm. We have proposed different assessment activities as a result of our work. This assessment is the consequence of using different methodologies. One of these methodologies is the use of games for learning Mathematics. Our students like playing video games and also board games. Is it possible to think that they could learn and acquire competencies by playing games? We present here our results about the evaluation of engineering students from engineering degrees.

A MODEL FOR ASSESSMENT OF MATHEMATICAL COMPETENCIES IN ENGINEERING EDUCATION

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Abstract. This paper discusses issues related to the competence-oriented education and assessment of the knowledge of mathematics of university students. A specific model is presented for the assessment of mathematical competencies in vector algebra for engineering degrees.

PROBABILITY AND STATISTICAL METHODS: ASSESSING KNOWLEDGE AND COMPETENCIES

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Abstract. This paper emerges as one of the results of RULES_MATH project which aims to describe and analyse ways to assess mathematics taught to future engineers through competencies. The eight mathematical competencies already identified are recognized in the assessment made to students. In this work the competencies for learning probability theory concepts are evaluated. The study initiated in 2017 was carried out in a group of Mechanical Engineering students from Coimbra Institute of Engineering, Portugal. The results obtained referrers to the test as a tool to assess most of the competencies that we need to evaluate, and to its fitness to our students.

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MATHEMATICS FOR ENGINEERS: ASSESSING KNOWLEDGE AND COMPETENCIES

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Abstract. This work follows from the RULES_MATH project which aims to describe and analyse ways to assess mathematics taught to future engineers through competencies. The eight mathematical competencies already identified are recognized in the assessment made to students. Thus, in this work the competencies for learning complex numbers are evaluated. The study was carried out in a group of 126 students of Linear Algebra from Biomedical, Electromechanical and Mechanical Engineering in Coimbra Institute of Engineering. The results obtained were satisfactory since at almost questions (7 out of 9) students were able to obtain a positive grade. The performed assessment test also permits to identify level differences between the courses where it was applied. Relating the test itself as a tool to assess competencies, we may conclude that it covers most of the competencies that we need to evaluate, and its difficulty is adequate to our students.

SOLVING REAL LIFE PROBLEMS USING MATRICES AND DETERMINANTS

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Abstract. In this paper we provide several real-world motivated examples illustrating the power of the linear algebra tools as the product of matrices. In this sense, we present some illustrative practical applications related to matrices and determinants.

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SOME PRACTICAL APPLICATIONS OF MATRICES AND DETERMINANTS IN REAL LIFE

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Abstract. In this paper, we present some applications of math in other domains also in real life problems. In this sense, we have some illustrative practical applications related to matrices and determinants.

INCREASING STUDENTS' MOTIVATION EXAMPLE FROM DISCRETE MATHEMATICS

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Abstract. In mathematics education, especially for engineering students, two main problems occur, the first one being unfamiliarity with the language of mathematics, the second one being students' motivation. Very often students, especially engineering ones, perceive mathematics as an obstacle to their engineering degree, which results in surface learning. The contribution deals with one example of a part of a discrete mathematics course that can serve well to increase motivation of students to work with mathematical notions and develop some mathematical competencies. Experience from teaching discrete mathematics course for 1st and 2nd year students is given.

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ASSESSMENT OF MATHEMATICAL COMPETENCE VIA CONTENTS MODELS

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Abstract. Competency based education has taken on increased importance, and today it seems to be the answer on how to prepare students for their future occupations when very quickly changing technology considerably influences the character of all human activities. But how to learn teach and assess competences? The paper presents the partial outputs of the Rules_Math Project co-funded by the Erasmus+ Programme of the European Union designing the standards for assessment of mathematical competence at technical bachelor studies via contents models. In addition, we introduce a particular model designed at FME STU for assessing mathematical competencies on differentiation.

A NEW NUMERICAL METHODS LIBRARY FOR MAPLE

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Abstract. We introduce a new numerical methods library for Maple. We compare its commands with their standard Maple counterparts, based on features that could be found desirable when we want our students to experiment and explore.

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