University of Applied Sciences and Arts Northwestern Switzerland
School of Business

Module Outline

Virtual Exchange Autumn Semester 2023

Business Mathematics 2

Credits: 5 ECTS

Format: Online course

Responsible FHNW lecturers

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1. Number of students accepted in the course

Number of exchange students from one partner university of School of Business FHNW is limited to 2 students per partner university.

2. Course content

Linear algebra is introduced through the lens of complex systems and artificial intelligence. It covers the fundamental concepts of vectors and matrices, systems of linear equations, linear transformations, determinants, and eigenvalues and eigenvectors. The course forms the basis for many advanced and modern topics such as complex systems science, artificial intelligence, machine learning, data science, and cryptography. It follows a virtual flipped classroom and is therefore taught entirely virtual and involves a large portion of guided and autonomous self-study.

3. Learning objectives

Students should have the following competencies after completing this course:

Knowledge and understanding

Students understand and are able to explain basic linear algebra concepts and are able to relate these basic linear algebra concepts to complex systems and artificial intelligence case studies. (Obj. 2.1)

Application of knowledge and understanding

Students are able to solve respective exercises and discuss case studies. (Obj. 4.1)

Ability to make judgements

Students can interpret solutions and justify assumptions of methods from linear algebra.

Communication

Students can express, in own words, mathematical results of methods from linear algebra.

Self-learning skills

Students can learn new concepts and methods from linear algebra.

4. Workload and format

The number of credits to be obtained is 5 ECTS, which equals 150 study hours. 8% is online classroom instruction, 57% is guided self-study, and 35% is autonomous self-study.

This course is offered as an online module. In order to gather and exchange information in the best possible way across countries, a wide variety of learning methods are chosen:

- Computational Exploration
- Lecture Notes

- Case Study
- Exercise
- Virtual Peer-Support
- Video-Based Class Feedback
- Chat-Based Individual Coaching

5. Prior knowledge and entry requirements

No prior knowledge and entry requirements are required for this course.

6. Course structure and dates

This course is a 100% virtual course with chat-based coaching and class feedback given by the lecturer through asynchronous video posts.

No.	Date / CW	Topics/Content
1	19.09.23 / 38	Video: Course Introduction / Motivation Vectors and Matrices Guided Self-Study: Vectors and Matrices
2	26.09.23 / 39	Guided Self-Study: Vectors and Matrices Video: Lecturer addresses posted Questions
3	03.10.23 / 40	Video: Motivation Systems of Linear Equations Guided Self-Study: Systems of Linear Equations
4	10.10.23 / 41	Guided Self-Study: Systems of Linear Equations Video: Lecturer addresses posted Questions
5	17.10.23 / 42	Video: Motivation Linear Transformations Guided Self-Study: Linear Transformations
6	24.10.23 / 43	Guided Self-Study: Linear Transformations Video: Lecturer addresses posted Questions
7	31.10.23 / 44	Video: Motivation Determinants Guided Self-Study: Determinants
8	07.11.23 / 45	Guided Self-Study: Determinants Video: Lecturer addresses posted Questions
9	14.11.23 / 46	Video: Motivation Eigenvalues and Eigenvectors Guided Self-Study: Eigenvalues and Eigenvectors
10	21.11.23 / 47	Guided Self-Study: Eigenvalues and Eigenvectors
11	28.11.23 / 48	Guided Self-Study: Eigenvalues and Eigenvectors Video: Lecturer addresses posted Questions
12	05.12.23 / 49	Video: Review, Evaluation, and Outlook
	12.12.23 / 50	No Class
	19.12.23 / 51	No Class

7. Assessment

There are five assessments (one for each topic, equally weighted) during the semester in the form of graded exercises/learning documentation.

The 5 ECTS points for this course are awarded if the final grade is a pass (see chapter 10).

8. Responsible Lecturers

Since 2018, Patrik Christen is a lecturer at the Institute for Information Systems at FHNW and responsible for teaching Business Mathematics 2 in the Business Information Technology study. He is also responsible for teaching Programming 1 in BIT Brugg and the elective Algorithms and Data Structures. His research focuses on the understanding of complex systems through computer modelling, mathematics, and philosophy. Before joining FHNW, Patrik held postdoctoral and senior research associate positions at ETH Zurich in Switzerland and Oxford University in the UK, where he explored the biomechanics of bones and insect flight, respectively. He received his PhD from the Eindhoven University of Technology in the Netherlands in the field of computational biomechanics.

9. Literature

Required Reading: Lecture notes provided by the lecturer.

Recommended Further Reading: David Poole. Linear Algebra: A Modern Introduction. 4th Edition, Cengage Learning, 2015.

10. Marking

Mark	6	5.5	5.0	4.5	4.0	below 4
in words	excellent	very good	good	satisfactory	pass	fail

This performance report is based on the Study and Examinations Regulations for the Bachelor of Science in Business Administration (International Management) at the FHNW, dated Version August 2008.

The student has the right to appeal against the above decision within a period of not more than 14 days of its being communicated. Any appeal must be made to the dean of the school in writing and be accompanied by valid arguments. Appeals based on objections to the results of individual assessments of the student's performance cannot be considered.