

## *Further Calculus*

Lecturer: Kirill Bukin

### **Abstract**

An elective course for the undergraduate students on specialization Mathematics and Economics.

Broadly speaking, the topics are:

- Refreshing of the functions of one variable,
- The Riemann integral,
- Improper integrals,
- Double integrals,
- Manipulation of integrals,
- Laplace transform.

Upon completion of Further Calculus students will have to take the University of London (UoL) exam at the end of the fourth semester of their studies at ICEF.

### **Prerequisites**

This course is a continuation of Linear Algebra (Calculus **MT1 173**) which is taught for the second-year students.

### **Learning Objectives and Outcomes**

The discipline is intended to:

- Enable students to acquire further skills in the techniques of calculus,
- Prepare students for further courses in mathematics and related subjects like econometrics and actuarial science,
- Enable understanding of the principles underlying the subject of calculus.

The student should be able to apply professional knowledge and skills acquired while studying the course in practical areas, including academic research, work in financial institutions, industry, state governance.

### **Methods of Instruction**

The course program consists of:

- lectures,
- classes,
- regular self-study that includes the work on home assignments.

## **Grading System and Knowledge Assessment**

Control takes the following forms:

- written home assignments posted and turned in by the students once a month (4 in total);
- mid-term test on the 8<sup>th</sup> week of classes (80 min);
- December exam (120 min) similar to external UoL exam on Further Calculus MT2176.

The cumulative final grade is comprised of:

- average grade for the home assignments (25%);
- Mid-term test grade (25%);
- December exam (50%).

Sample materials for knowledge assessment are available in ICEF Information system at <https://icef-info.hse.ru>.

## **Required Reading**

1. Adam Ostaszewski. *Advanced Mathematical Methods* (Cambridge: Cambridge University Press, 1990).
2. Study Guide on Further Calculus MT2176 by A. Ostaszewski and J.M.Ward.

## **Optional Reading**

1. Ken Binmore and Joan Davies. *Calculus: Concepts and Methods*. (Cambridge: Cambridge University Press, 2002).

## **Internet resources**

University of London Exam papers and Examiners reports for the last three years  
[http://www.londonexternal.ac.uk/current\\_students/programme\\_resources/lse/index.shtml](http://www.londonexternal.ac.uk/current_students/programme_resources/lse/index.shtml)  
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## **Special Equipment and Software Support**

Laptop, projector, Internet connection  
MS Word, MS Excel

## **Course plan**

1. Limits.
2. The Riemann integral.
3. Improper integrals.
4. Double integrals.
5. Manipulation of integrals.
6. Laplace transforms.