Czech Technical University in Prague
Faculty of Mechanical Engineering
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Mathematics II – Schedule of Tutorials in the Academic Year 2025/26

1. **Week (February 16 – 20):**
Riemann integral of a function of one variable. Emphasis on integrals in tasks of the subject Mathematics II. Simple integrals $\int f(x,y)\,\mathrm{d}x$, or $\int f(x,y)\,\mathrm{d}y$.
Conic sections, sets bounded by them in $\mathbb{E}_2$. Quadratic surfaces in both basic and shifted positions. Sets bounded by them in $\mathbb{E}_3$.

2. **Week (February 23 – 27):**
Functions of two and three variables: domain, continuity, graph. Partial derivatives of the first order, geometric meaning. Gradient of a function and its geometric and physical interpretation.

3. **Week (February 2 – March 6):**
Tangent plane, normal vector, equation of the normal to the graph of the function $z = f(x,y)$. Approximate calculation of the function value. Total differential. Directional derivative and its calculation, geometric meaning.

4. **Week (March 9 – 13):**
Partial derivatives of higher orders. Local extrema of the function $z = f(x,y)$. Necessary and sufficient conditions. Examination of local extrema of simple functions. Investigation of global extrema of simple functions. Constrained extrema.

5. **Week (March 16 – 20):**
Function of one variable $y = f(x)$ defined implicitly by the equation $F(x,y) = 0$. Verification of assumptions about the existence of the function $y = f(x)$ and the continuity of its derivative. Calculation of the first and second derivatives. Equation of the tangent to the graph of the implicitly defined function. Approximate calculation of the function value.

6. **Week (March 23 – 27):**
Double integral. Calculation of the double integral using Fubini's theorem. Geometric and physical applications (area of a planar figure, mechanical characteristics of a planar plate).

7. **Week (March 30 – April 3; Good Friday, April 3 canceled):**
Double integral. Transformation into polar or generalized polar coordinates.

8. **Week (April 6 – 10; Easter Monday, April 6 canceled):**
Triple integral. Fubini's theorem. Transformation into cylindrical coordinates. Volume of a body, calculation of mechanical characteristics of bodies.

9. **Week (April 13 – 17):**
Triple integral. Calculation of triple integrals using transformation into spherical coordinates. Simple smooth curves in $\mathbb{E}_2$ and $\mathbb{E}_3$, their parametrization. Line segment, circle, ellipse, helix. Graph of a function of one variable $y = f(x)$, or $x = g(y)$. Curve with a given parametrization.

10. **Week (April 20 – 24; Dean's Day canceled on Tuesday, April 21):**
Line integral of a scalar function. Line integral of a vector function.
Applications of the line integral.

11. **Week (April 27 – May 1; Labor Day, May 1, canceled without replacement):**
Circulation of a vector field over a closed curve in $\mathbb{E}_2$. Green's theorem.

12. **Week (May 4 – 8; Victory Day, Friday May 8, canceled):**
Independence of the line integral of a planar vector field on the integration path in $\mathbb{E}_2$. Potential field in $\mathbb{E}_2$, sufficient conditions. Calculation of potential by the first method (see textbook).

13. **Week (May 11 – 15; Rector's Day, Wednesday May 13, canceled):**
Calculation of the surface integral of a scalar function and vector function over a simple smooth surface shaped as a (part of the) graph of a function of two variables and on a surface whose parametrization is given. Simple examples of the application of Gauss's-Ostrogradsky theorem. Problems with geometric and physical applications.

14. **Week (May 18 – 22):** Replacement classes for missed lessons:

May 18: Replacement for Easter Monday, April 3

May 19: Replacement for Dean's Day on Tuesday, April 21

May 20: Replacement for Rector's Day on Wednesday, May 13

May 21: Replacement for Victory Day on Friday, May 8

May 22: Replacement for Good Friday, April 6

Seminar Schedule for Mathematics II:
The seminar schedule thematically aligns with the exercise schedule. The seminars will also address problems similar to those from the semester examinations of Mathematics II from previous years.