

| | | | |
|------------------------------------|--|------------------|----------------|
| COURSE NAME: Calculus II | | | |
| DEGREE: Engineering Physics | | COURSE: 1 | TERM: 2 |

| SCHEDULE | | | | | | | | | |
|-----------------|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------|--|--|----------------------------------------------------------------------|------------------|----------------------------------------|
| WEEK | SE- SSION | SESSION CONTENT | GROUP (Tick X) | | | | STUDENT WORK DURING WEEK | | |
| | | | LARGE | SMALL | | | DESCRIPTION | LECTURE HOURS | STUDENT WORK Max 7 h per week |
| 1 | 1 | CHAPTER 1: DIFFERENTIAL CALCULUS IN SEVERAL VARIABLES 1.1 Basic notions in \mathbb{R}^n 1.2 Functions of n variables | 1 | | | | Sections 15.1-15.3 and 15.5 [SHE] and/or sections 1.5, 2.1, 2.2 [MT] | 1,66 | |
| | 2 | (* Discussion of selected exercises | | 1 | | | (**) Problem solving for selected exercises | 1,66 | 6,5 |
| 2 | 3 | 1.3 Limits and Continuity | 2 | | | | Section 15.6 [SHE] and/or section 2.2 [MT] | 1,66 | |
| 2 | 4 | (* Discussion of selected exercises | | 2 | | | (**) Problem solving for selected exercises | 1,66 | 6,5 |
| 3 | 5 | 1.4 Differentiability - Partial derivatives - Matrix of derivatives | 3 | | | | Sections 15.4, 16.1 [SHE] and/or section 2.3 [MT] | 1,66 | |
| 3 | 6 | (* Discussion of selected exercises | | 3 | | | (**) Problem solving for selected exercises | 1,66 | 6,5 |
| 4 | 7 | - Chain rule - Directional derivatives; gradient vector | 4 | | | | Sections 16.2-16.4 [SHE] and/or sections 2.5, 2.6 [MT] | 1,66 | |
| 4 | 8 | (* Discussion of selected exercises | | 4 | | | (**) Problem solving for selected exercises | 1,66 | 6,5 |
| 5 | 9 | CHAPTER 2: LOCAL PROPERTIES OF FUNCTIONS 2.1 Higher order derivatives and differential operators - Iterated derivatives; equality of mixed partials - Divergence, curl, Laplacian | 5 | | | | Sections 16.5, 18.8 [SHE] and/or sections 3.1, 4.3, 4.4 [MT] | 1,66 | |
| 5 | 10 | Midterm Exam 1 (* Discussion of selected exercises | | 5 | | | (**) Problem solving for selected exercises | 1,66 | 6,5 |
| 6 | 11 | 2.2 Optimization - Local extrema - Absolute/global extrema - Free and constrained optimization problems | 6 | | | | Sections 16.5, 16.6, 16.7 [SHE] and/or sections 3.3, 3.4 [MT] | 1,66 | |
| 6 | 12 | (* Discussion of selected exercises | | 6 | | | (**) Problem solving for selected exercises | 1,66 | 6,5 |

| | | | | | | | | |
|----|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|--|---------------------------------------------------------------|------|-----|
| 7 | 13 | CHAPTER 3: INTEGRAL CALCULUS ON \mathbb{R}^n 3.1 Double integrals - Iterated integrals - Cavalieri's principle - Integrals over rectangular regions; Fubini's theorem | 7 | | | Sections 17.1, 17.2 [SHE] and/or sections 5.1-5.2 [MT] | 1,66 | |
| 7 | 14 | (*) Discussion of selected exercises | | 7 | | (**) Problem solving for selected exercises | 1,66 | 6,5 |
| 8 | 15 | - More general regions - Change in the order of integration 3.2 Triple integrals | 8 | | | Sections 17.3, 17.5-17.7 [SHE] and/or sections 5.3-5.5 [MT] | 1,66 | |
| 8 | 16 | Midterm Exam 2 (*) Discussion of selected exercises | | 8 | | (**) Problem solving for selected exercises | 1,66 | 6,5 |
| 9 | 17 | 3.3 Change of variables - Change of variables; Jacobian | 9 | | | Section 17.10 [SHE] and/or sections 6.1, 6.2 [MT] | 1,66 | |
| 9 | 18 | (*) Discussion of selected exercises | | 9 | | (**) Problem solving for selected exercises | 1,66 | 6,5 |
| 10 | 19 | - Polar, cylindrical, and spherical coordinates 3.4 Applications - Average; center of mass; moments of inertia | 10 | | | Sections 17.4, 17.8, 17.9 [SHE] and/or sections 6.2, 6.3 [MT] | 1,66 | |
| 10 | 20 | (*) Discussion of selected exercises | | 10 | | (**) Problem solving for selected exercises | 1,66 | 6,5 |
| 11 | 21 | CHAPTER 4: INTEGRALS OVER CURVES AND SURFACES 4.1 Line and path integrals - Parametrized curves - Path integral; line integral - Conservative fields | 11 | | | Sections 18.1, 18.2, 18.4 [SHE] and/or sections 7.1, 7.2 [MT] | 1,66 | |
| 11 | 22 | (*) Discussion of selected exercises | | 11 | | (**) Problem solving for selected exercises | 1,66 | 6,5 |
| 12 | 23 | 4.2 Surface integrals - Parametrized surfaces - Area of a surface - Integrals of scalar functions and vector fields | 12 | | | Sections 18.6-18.8 [SHE] and/or sections 7.3-7.6 [MT] | 1,66 | |
| 12 | 24 | Midterm Exam 3 (*) Discussion of selected exercises | | 12 | | (**) Problem solving for selected exercises | 1,66 | 6,5 |
| 13 | 25 | 4.3 Integral theorems of vector analysis - Green's theorem - Stokes' theorem | 13 | | | Section 18.5, 18.10 [SHE] and/or sections 8.1,8.2 [MT] | 1,66 | |
| 13 | 26 | (*) Discussion of selected exercises | | 13 | | (**) Problem solving for selected exercises | 1,66 | 6,5 |
| 14 | 27 | - Characterization of conservative fields - Gauss' theorem | 14 | | | Section 18.8, 18.9 [SHE] and/or sections 8.3,8.4 [MT] | 1,66 | |
| 14 | 28 | (*) Discussion of selected exercises | | 14 | | (**) Problem solving for selected exercises | 1,66 | 6,5 |

| | | | | | | | |
|-----------------|--|---------------------------------|--|--|--|------------------|----------------------------|
| SUBTOTAL | | | | | | | 46.66 + 91 = 137,66 |
| 15-17 | | Extra sessions, tutorials, etc. | | | | Exam preparation | 12.33 h |
| TOTAL | | | | | | | 150 |

[MT] Marsden and Tromba, "Vector Calculus", W. H. Freeman (5th edition, 2003)

[SHE] Salas, Hille, and Etgen, "Calculus: one and several variables", Wiley (10th edition, 2007)

(*) Discussion of selected exercises from the course collection that correspond to the previous large-group lecture

(**) Problem solving for selected exercises from the course that correspond to the previous large-group lecture