

Semester I

Subject 1

ME010101 Abstract Algebra

Text book : John B. Fraleigh, A first course in abstract algebra, 7th edition, Pearson Education, 2003

Week 1 Introduction to abstract algebra, direct product of groups, finite cyclic groups, fundamental theorem of finitely generated abelian groups, decomposable group, finite indecomposable abelian groups. Reading : §11.1-17
Nov 6, 2020 Assignment : Exercises 11

Week 2 factor group, normal subgroup, fundamental homomorphism theorem, inner automorphisms, conjugate subgroups. Reading : §14.1-15
Nov 13, 2020 Assignment : Exercises 14

Week 3 group action, homomorphism into permutations of G-set, faithful action, transitive action, isotropy subgroups G_x , orbits X_g , index of isotropy subgroups $(G : G_x)$. Reading : §16.1-17
Nov 20, 2020 Assignment : Exercises 16

Week 4 Burnside's formula, corollary. Reading : §17.1-7
Nov 27, 2020 Assignment : Exercises 17
Nov 30, 2020 Module 1 Internal Examination

Week 5

Subject 2

ME010102 Linear Algebra

Week 1

Subject 3

ME010103 Basic Topology

Week 1

Subject 4

ME010103 Real Analysis

Week 1

Subject 5

Graph Theory

Week 1

Semester II

Subject 6

ME010201 Advanced Abstract Algebra

Week 1

Subject 7

ME010202 Advanced Topology

Week 1

Subject 8

Numerical Analysis with Python3

Revision Plan

- Day 1 Gauss elimination - Elimination phase('Pivot Equation', n^3 operations), Back substitution phase. §2.2(Kiusalaas pages 37-44) **Oct 8, 2020**
- Day 2 Doolittle LU decomposition - ('LU' factorisation, Comparison), Modifications to Gauss Elimination, combined matrix, Forward + Back substitution §2.3(Kiusalaas pages 44-47) **Oct 9, 2020**
- Day 3 Numerical Integration - Lagrange's interpolant, Newton-Cotes formula **Oct 12, 2020**

Subject 9

ME010204 Complex Analysis

Week 1

Subject 10

ME010205 Measure & Integration

Week 1

Semester III

Subject 11

**ME010301 Advanced
Complex Analysis**

Week 1

Subject 12

ME010302 Partial Differential Equations

Week 1

Subject 13

ME010303 Multivariate Calculus & Integral Transforms

Textbooks : Tom M. Apostol, Mathematical Analysis, 2nd Edition, Addison-Wesley, 1974

Walter Rudin, Principles of mathematical analysis, 3rd Edition

- Week 1 Weierstrass approximation theorem, other forms of Fourier series, Fourier integral theorem, exponential form of Fourier integral theorem, integral transforms. Reading : §11.15-20
- Week 2 directional derivatives, total derivative, complex valued functions, matrix of linear functions, Jacobian matrix. Reading: §12.1-8
- Week 3 chain rule, matrix form of chain rule, mean-value theorem. Reading : §12.9-11
- Week 4 convolution theorem for Fourier transforms. Reading : §11.21 (pending)
Oct 12, 2020 Internal Examination Module 1 & 2
- Week 5 sufficient condition for differentiability, sufficient condition for equality of partial derivatives. Reading : §12.12-13
Oct 16, 2020
- Week 6 implicit function, Jacobian determinant $J_f(\bar{x})$, Jacobian determinant of complex-valued functions, properties of functions with non-zero Jacobian determinant, inverse function theorem, implicit function theorem. Reading : §13.1-4
Oct 23, 2020
- Week 7 extrema of function on one variable, extrema of functions on several variables. Reading : §13:5-6
Oct 30, 2020
- Week 8 k-cell I_k , integration over k-cell, support, primitive mappings, flip, local representation as composition of primitives and flips, partitions of unity,

change of variables on continuous functions with compact support. Reading : §10.1-9

Nov 6, 2020

Week 9 k -surface, k -form (differential form of order k), properties of k -forms, basic k -forms. Reading : §10.10-14

Nov 13, 2020

Subject 14

ME010304 Functional Analysis

Week 1

Subject 15

ME010305 Optimization Technique

Week 1

Semester IV

Subject 16

ME010401 Spectral Theory

Week 1

Subject 17

**ME010402 Analytic
Number Theory**

Week 1

Subject 18

ME800401 Differential Geometry

Week 1

Subject 19

ME800402 Algorithmic Graph Theory

Week 1

Subject 20

ME800403 Combinatorics

Week 1

Subject 21

Probability Theory

Week 1

Subject 22

Operational Research

Week 1

Subject 23

Operational Research

Week 1

Subject 24

Commutative Algebra

Week 1

Subject 25

Ordinary Differential Equations

Week 1

Subject 26

Classical Mechanics

Week 1

Bibliography