

TU DARMSTADT

---

# Advanced topics in quantum field theory

---

*Author:*  
Matthias HEINZ

March 1, 2020



# Abstract

These notes grew out of the Quantum Field Theory 2 course taught by Prof. Buballa at the TU Darmstadt. By writing these notes, I hope to better understand the material.



# License

This work is licensed under a Creative Commons “Attribution 4.0 International” license.





# Contents

Abstract	i
License	iii
Contents	v
List of Tables	vii
List of Figures	ix
1 Renormalization	1
2 The renormalization group	3
3 The path integral	5
4 Spontaneous symmetry breaking	7
5 The gauge principle	9
6 Non-abelian gauge theories	11
A The spectral representation	13





# List of Tables



# List of Figures



# Chapter 1

## Renormalization



## Chapter 2

# The renormalization group





## Chapter 3

### The path integral



## Chapter 4

# Spontaneous symmetry breaking



# Chapter 5

## The gauge principle



## Chapter 6

# Non-abelian gauge theories





# Appendix A

## The spectral representation

