

Plan for the tutorial classes

Mathematical Methods in Physics, fall 2018

Carl Niblaeus

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This document outlines the plan for the tutorial classes. *It may be updated during the course.*

During the tutorial classes we will go through as much as possible from the problems listed below. We may also for example go through some “clickers” question (for this you need to bring an electronic device with internet connection such as a cellphone, tablet or laptop) or there may be time to solve problems on your own (with the possibility to ask questions).

In the list of problems, the format “PX YYYY-MM-DD” refers to problem X from the exam on the date YYYY-MM-DD (as found in the link to the old exams on the homepage). The format “PX.Y.Z” refers to problem X.Y.Z from the course book.¹ That is, “P7 2012-11-10” refers to problem 7 from the exam 2012-11-10 and “P7.4.1” refers to problem 7.4.1 from the book (on page 346).

Tutorial class 1, 6/9

Topics: Separable ODE:s. Frobenius method. ODE:s with constant coefficients.

Problems: P7 2012-11-10, P7.3.2, P3 2013-11-09, P7.4.1

Tutorial class 2, 13/9

Topics: Inhomogeneous ODE:s. Sturm-Liouville theory. Separation of variables and the heat equation.

Problems: P5 2015-01-02, P3 2011-01-05, P8.2.7, P5 2008-06-17

Tutorial class 3, 17/9

Topics: Green’s functions.

Problems: P10.1.4, P7 2014-11-08, P9 2014-01-02, P5 2006-06-02

¹Arfken, Weber & Harris, *Mathematical Methods for Physicists*, 7th ed. An e-book in pdf format can be found at <http://libris.kb.se/bib/13418437>.

Tutorial class 4, 21/9

Topics: Complex analysis. Cauchy's integral theorem.

Problems: P11.2.11, P11.3.7, P11.4.1, P11.4.8

Tutorial class 5, 1/10

Topics: Residue calculus.

Problems: P1 2016-01-20, P1 2014-11-08, P1 2015-01-02, P1 2013-01-03

Tutorial class 6, 4/10

Topics: Gamma function. Bessel functions.

Problems: P7 2015-01-02, P6 2011-01-05, P7 2010-01-04, P7 2010-10-30, P7 2011-10-29

Tutorial class 7, 10/10

Topics: Legendre functions.

Problems: P2 2011-10-29, P7 2009-10-24, P4 2015-01-02, P2 2016-01-20, P6 2013-11-09

Tutorial class 8, 15/10

Topics: CMB and spherical harmonics. Fourier transform.

Problems: P2 2014-11-08, P3 2005-05-30

Tutorial class 9, 22/10

Topics: Fourier and Laplace transform.

Problems: P10 2013-11-09, P7 2013-01-03, P1 2007-06-19, P6 2015-01-02

Tutorial class 10, 25/10

Topics: Laplace transform. Repetition (send in requests by Sunday Oct 21, otherwise I'll pick out some problems myself).

Problems: P9 2014-11-08, P7 2016-01-20, P3 2011-01-05, if time P4 2014-01-02. (P11.9.5).