MATH3977/4077 Information Sheet

Semester 2, 2020

Lagrangian and Hamiltonian Dynamics (Advanced)

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Lectures

Tue  12:00  Zoom*
Wed  12:00  Zoom*
Thu  12:00  Zoom*

*Lecture notes are essential and can be purchased from KOPYSTOP.

Tutorials

Wed  2:00  Zoom*
or
Thu  9:00  Zoom*

Assessment

Exam  70%  
Quizz 1  10%  Tuesday 12:00, week 7, 13 October
Quizz 2  10%  Thursday 12:00, week 11, 12 November
Assignment  10%  due Friday week 12, 20 November

ONLINE RESOURCES

All tutorial questions and solutions, assignment questions, past exams and feedback will be online via the web page


and also on the MATH3977/4077 Canvas page

https://canvas.sydney.edu.au/courses/27261

The Ed discussion forum is at

https://edstem.org/courses/4732/

Lecture Recordings are accessible through the Canvas page.

For general information also see the Senior Mathematics and Statistics Handbook.

* links to all Zoom sessions are available on the Canvas page
ASSUMED KNOWLEDGE

From High School
- Trigonometric identities
- Derivatives of algebraic, trig, inverse trig, exponential and logarithmic functions
- Integration: change of variables, integration by parts, partial fractions, trig substitutions, 
  \( t = \tan(\theta/2) \) substitution
- Curve sketching: intercepts, turning points, inflections, asymptotes

From First and Second Year
- Coordinates: equations for simple surfaces (lines, planes, spheres), change of variables 
  from cartesian to polar
- Hyperbolic trig functions and identities
- Calculus: Functions of several variables, partial derivatives, chain rule, implicit differenti-
  ation, change of variables in multiple integrals
- Matrices: determinants, inverses, finding eigenvalues
- Vector algebra: dot and cross product, simple identities, geometric interpretations
- Vector calculus: div, grad and curl
- Differential equations: separation of variables for 1st order ODE, finding exponential and 
  trig solutions for 2nd order linear ODE, DEs with simple RHS functions

Some Greek symbols as used in maths

The more advanced the courses get, the more we have to rely on letters from other alphabets, 
but we try to use them in a consistent way. Some have fixed meanings in various branches of 
physics or engineering, but can be used differently in maths.

Usually used for angles theta \( \theta \), curly theta \( \vartheta \), phi \( \phi \), curly phi \( \varphi \), psi \( \psi \)

Capital letter versions of angles Theta \( \Theta \), Phi \( \Phi \), Psi \( \Psi \)

Usually a frequency or angular velocity omega \( \omega \), capital Omega \( \Omega \)

Used for small quantities and limits delta \( \delta \), epsilon \( \epsilon \), curly epsilon \( \varepsilon \), capital Delta \( \Delta \)

Equivalent to a,b,c alpha \( \alpha \), beta \( \beta \), gamma \( \gamma \), capital Gamma \( \Gamma \)

Equivalent to k,l,m,n kappa \( \kappa \), lambda \( \lambda \), mu \( \mu \), nu \( \nu \), capital Lambda \( \Lambda \)

Equivalent to r,s,t rho \( \rho \), sigma \( \sigma \), tau \( \tau \)

Equivalent to x,y,z xi \( \xi \), eta \( \eta \), zeta \( \zeta \), capital Xi \( \Xi \)

Used for x, k or q chi \( \chi \)

Three seldom used letters iota \( \iota \), omicron \( \omicron \), upsilon \( \upsilon \) (they look too much like roman 
  letters)

... and of course ... pi \( \pi \)