PHYS3041: Plasma Physics Logistics

March 7, 2013

1 Lecturer Contacts

• Module 1: Greg von Nessi (greg.vonnessi@anu.edu.au)
• Module 2: Michael Fitzgerald (michael.fitzgerald@anu.edu.au)

2 Lecture Time & Location

• Lecture Location: LeCouteur Seminar Room of the Research School of Physics and Engineering (top floor, west end of building 60)
• Times: Monday 2:30-4:30pm\textsuperscript{1}; Thursday 3:00-4:00pm
• Supplemental tutorials may be offered (depends on gauged need and availability of the class and lecturers).

3 Course Materials

Module 1 Specific: Course Outline, assignments and any lecture notes will be made available at http://people.physics.anu.edu.au/~gvn105/.

Both modules will roughly follow Prof. John Howard’s notes, which are freely available at http://physics.anu.edu.au/prl/intranet/c17_course.php.

\textsuperscript{1}Monday March 11th is an ACT holiday, so the lecture for this day (in module 2) will have to be scheduled for another day that week.
4 Assessment

• 20% Weekly ten minute quizzes (5 total with equal weighting of 4% each, relative to the final mark). Tentatively, these quizzes will be given every Monday after the first week.

• 80% Take home assignments.
  – There will be six weekly assignments and two module assignments with more open-ended problems that will be due at the end of each module, along with the final weekly assignments associated with that module.
  – Module 1 Specific: Each weekly assignment is worth 8% of the student’s overall grade, with the module assignment being worth 16% of the overall grade.
  – Module 1 Specific: Weekly assignments for module 1 will be due every Thursday at 5pm. Assignments due will roughly correspond to material covered in the previous week of lectures. The final weekly assignment and module assignment for module 1 will be due the first Thursday in module 2 (March 14th) at 5pm.
  – Students are encouraged to collaborate on assignments, with the minimal expectation that any qualitative descriptions/discussion be in the student’s own words, with quoted/paraphrased text being properly cited. Failure to uphold this expectation will result in grading penalties for all students involved.

5 Module 1 Assessment Calendar

• Feb 21: Weekly assignment 1 and module 1 assignment (Part I) become available.

• Feb 25: In-class quiz

• Feb 28: Assignment 1 due; assignment 2 and module 1 assignment (Part II) become available

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\(^2\) Makeup quizzes will be provided, if compelling evidence is provided showing extenuating circumstances that prevented attendance or the lecturer is notified ahead of time.

\(^3\) This breakdown is tentative and may change over the module duration.

\(^4\) You may also email the assignment in or put it in the lecturer’s mailbox on the second floor of the LeCouter Building.
• March 4: In-class quiz; assignment 1 returned; assignment 3 becomes available

• March 7: Assignment 2 due; Module 1 lectures end

• March 12: Assignment 2 grades available

• March 12-15: In-class quiz covering final week of module 1

• March 14: Assignment 3 due; Module 1 assignment due

• March 18: Assignment 3 grades available; module 1 assignment grades available.

6 Module 1 Tentative Syllabus

• Feb 18; Lecture 1:
  – Course introduction and logistics
  – What is a plasma?
  – Examples of different types of plasma
  – The unified theory of collisionless plasmas
  – The web of plasma theories

• Feb 18; Lecture 2:
  – Debye shielding
  – Quasi-neutrality

• Feb 21; Lecture 3:
  – Collisions
  – Simple transport phenomena

• Feb 25; Lecture 4:
  – Simple transport phenomena (Continued)
  – Quantification of important plasma parameters
  – Phase space
  – The distribution function and Boltzmann equation
• Feb 25; Lecture 5:
  – Moments of the distribution function
  – Treatment of collisions in the Vlasov theory
• Feb 28; Lecture 6:
  – Entropy and the distribution function
  – Relation between pressure and Maxwellian
• Mar 4; Lecture 7:
  – Two-Fluid equations
• Mar 4; Lecture 8:
  – MHD
• Mar 7; Lecture 9:
  – Sheath physics and Langmuir probe theory