Physics & Astronomy
Lecture Course Report (2015/16 session)

Course Title: *Electricity section only*
Module: PHY102
Lecturer(s): Dr C N Booth

General Comments:
Performance was generally reasonable, though there were problems with people not answering the questions as written. The compulsory question was done quite well, as was question 2. Question 3 was not done so well. A criticism of most scripts was that very little explanation was given for the working.

Exam performance:
Qu. 1 Compulsory short answers. (Average mark 12.5/20 from 168 attempts.)

(a) Field due to two charges: many good answers, but a large number of people could not find the resultant of two vectors – magnitudes were simply summed, components given the wrong signs and sin/cos were swapped.

(b) Internal resistance: generally done well.

(c) Resistance of series/parallel network: almost everyone completed this successfully.

(d) Effect of dielectric on capacitor: many people did not explain the effect of the dielectric, and gave an expression for the capacitance of a parallel plate capacitor rather than stating the new capacitance in terms of C.

(e) Potential from field: Again explanations were lacking, signs were often wrong, and some people assumed either a uniform or inverse-square form for E rather than that given in the question..

(f) Free proton in field: generally done well.

(g) Zero-potential positions with two point charges: poorly done. Many stated that $V = 0$ where $E = 0$. Others wrote down the potential in terms of undefined r_1 and r_2, instead of x and L. Some got one of the two points.

Qu. 2 Gauss's law and spherical capacitor: The statement of Gauss's law was often sketchy, and many people did not justify the choice of Gaussian surface. Several quoted results for continuous charge distributions rather than the conducting surface specified in the question, and others used the formula for a parallel plate capacitor where that for a spherical capacitor was given. (Average mark 12.8/20 from 86 attempts.)

Qu. 3 Electric dipole and limiting field: The definition of dipole moment was generally given correctly, though not everyone specified the direction. Similarly, many people did not specify the direction of the torque correctly, and when evaluating change in potential energy many assumed $\Delta\cos\theta$ was the same as $\cos(\Delta\theta)$. Though most people wrote down the field due to the three charges correctly, few could use a binomial expansion correctly, and even fewer managed to find the field at large r. (Many just stated it was zero.) A significant number of people did not even attempt section (c) (worth 11 marks). (Average mark 9.7/20 from 82 attempts.)

Overall section average: 59.5%