Week 9: Reading Assignment, Homework Assignment

Lecturer: Prof. Steven Errede
Email: **serrede@illinois.edu**
Office: 435 Loomis (4th floor, SW corner)
Office Phone: 333-0074. HEP Sec'ys: 441 Loomis (333-4452)
Office Hours: Anytime

Course Website: http://courses.physics.illinois.edu/phys598aem/

All lecture notes, homework, demos, references, *etc*. are available on the P598AEM website. Please spend some time checking these out!

Course Organization:

A. Lectures: Tuesday & Thursday, 12:30-1:50 pm, in 136 Loomis.
B. Weekly Reading and Homework Assignments: HW due following Thursday, in class.
C. Take-Home Midterm Exam: Oct. 10th, due Oct. 17th (in lieu of P598AEM HW 7).
D. Take-Home Final Exam: Dec. 10th, due Dec. 17th.

Reading Assignment For Week 9: Please read/work through P598AEM Lect. Notes 15-17.
Homework Assignment For Week 9: See/do HW # 9 problems on following pages.

Physics 598AEM Week 9 Homework Assignment

A spectrophotometer measures the spectral irradiance I_{meas} (Watts/m^2) of a black body in nine (9) wavelength bins, each $\Delta\lambda$ = 44 nm wide. A theoretical prediction also exists for the spectral irradiance I_{theory} (Watts/m^2) in each of these wavelength bins, as given in the table below:

Center Wavelength (nm)	I_{meas} (Watts/m^2)	I_{theory} (Watts/m^2)
348	1390±5	1396.46
392	1955±5	1949.03
436	2410±5	2406.06
480	2725±5	2730.69
524	2915±5	2921.47
568	3000±5	2996.34
612	2975±5	2980.37
656	2915±5	2921.75
700	2775±5	2772.58

a.) Make a plot of I_{theory} *vs*. center wavelength and overlay the I_{meas} *vs*. center wavelength data.

b.) Calculate the χ^2 between the data *vs*. theory prediction: $\chi^2 = \sum_{i=1}^{9}\left(I_i^{expt} - I_i^{thy}\right)^2 \Big/ \sigma^2_{I_i^{expt}}$

c.) How many free parameters N_{param} are there in this problem?
How many degrees of freedom N_{DoF} are there in this problem?

d.) Look up (or otherwise determine) the corresponding *p*-value = $C.L._{upper}^{SS}$ = single-sided upper confidence level for this χ^2 and this # degrees of freedom, N_{DoF}.