Syllabus	**PHYS 631** **The Physics of Astrophysics**	UMBC 2016 Fall

Credits 3 credits

Alt. Title *Radiation, Mater, & Fields*

Prerequiste Graduate at UMBC, or Undergraduate with permission from Instructor

Corequiste *None*

Lectures Tues, Thurs 10:00-11:15 (main campus) Physics, Rm 226 (unless otherwise posted)

Text(s) ***"High Energy Astrophysics"*** (3rd Ed)
Malcolm .S. Longair
Cambridge University Press, ISBN 978-0-521-75619-1
Also of use:

"Radiative Processes in Astrophysics"	Rybiki & Lightman	Wiley & Sons (1979) ISBN 978-0471827597
"Radiative Processes in High Energy Astrophysics"	Ghisellini	Springer ISBN 9783319006116 free e-version

A list of other free online resources will be provided.

Materials Scientific Calculator (non-programmable)
No devices (like smart-phones, tablets, etc) with internet-connectivity will be allowed in exams.

Instructor **Dr. Ian M George**

Office	Physics Room 410
Office Hours	**Tues, Thur 11:30-12:30**
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T.A./Grader *None*

Course Overview Introduction to the emission, absorption and scattering of radiation by matter in astrophysical environments, illustrated using recent results from the astrophysical literature. Topics include radiative transfer, statistical mechanics, local thermodynamic equilibrium, emission and absorption line diagnostics in common use and the effects of dust. These physical processes will be applied to stellar atmospheres, the interstellar medium, HII regions, supernova remnants, active galactic nuclei and clusters of galaxies. (Spring) Prerequisites: PHYS 601 and PHYS 605.

Course Objectives The main objectives of this Graduate-level course is to introduce students to some of the most important processes associated with the interaction of particles & (electric & magnetic) fields in astrophysical contexts. The detailed day-by-day syllabus will however be based upon the astronomical experiences & interests of the class. Students should not be expected to be 'lectured to". Instead they should ask clarification from the instructor. A major part of the final grade is likely to be determined on a research-based project conducted by the student (or group of students).

Course-specific learning objectives

By the end of the course students are expected to:

1. Have started supplementing any existing background knowledge of modern astrophysics with a broad overview of the field, techniques used, some of the jargon, & issues today
2. Have an overview of *some* of the fundamental emission processes in astrophysical objects. (Bremmstrahlung, Synchrotron, Compton Scattering *etc*).
3. Have developed 'self-study' skills whereby they are not simply 'lectured at', but rather use meetings to discuss the general concepts & some of the astrophysical applications of the math in the textbooks.
4. Start developing to skills associated with working as a team (*ie* a *"research group"),* construct a research plan, identify problems & propose possible solutions.
5. Start developing presentation skills, both written & oral *(including jumping up and using the whiteboard)*

Note: I want to keep this class somewhat 'flexible' in terms of the detailed syllabus, day-by-day schedule *etc*. The details will be determined by the incoming skill-set of the students, and their research aspirations.

Evaluation

The default grading scheme is listed below. "Homework" will consist of regular problems, but also background reading that students are expected to be able to answer orally in class.

Grading Summary

Project Work (incl presentations)	40%
Exam	30%
"Homework"	30%