

**Syllabus for Astro-imaging**  
Spring 2019  
Turtle Mountain Community College

**Instructor:** David A Wibe

**Prerequisite:** Students should have taken College Algebra (one year)  
Trigonometry, and Astronomy 110.

**Text:** Getting Started with Astrophotography Hall, Allan

**Calculator:** Scientific, with inverse trig functions, power and exponential functions.

**Instructor Office:** Teacher Ed Dept. 2<sup>nd</sup> floor Phone: 477-7862 ext. 1026

**Instructor schedule:**

Monday: 9:00- 10:20 Intro to astroimaging; Office Hours: 1:00-2:00

Tuesday: 9:00- 10:20 Intro to astroimaging; Office Hours: 1:00-2:00

Wednesday: 9:00- 10:20 Intro to astroimaging; Office Hours: 1:00-2:00

Thursday: 9:00- 10:20 Intro to astroimaging; Office Hours: 1:00-2:00

Friday: Office hours 9:00-11:00; 1:00-3:00

***All the information on this syllabus is subject to change. Changes will be announced in class and/or on Canvas. These changes will be updated on the online syllabus. The student is responsible for keeping up to date on any changes.***

**COURSE DESCRIPTION AND OBJECTIVE**

This intensive 8 week course is designed to introduce the tools and techniques necessary to help you become a successful Astro-imager. During our daytime lecture and evening imaging sessions, you will learn how digital images are created, the equipment used for gathering astro images, and the many types of targets that may be of interest to you.

**LEARNING OUTCOMES:**

After this course, students will be able to:

- Identify objects (targets) in the sky using both the az/alt and the RA/DE coordinate systems

- Compare the types of imagers (DSLR vs CCD).
- Understand the components of the different types of OTA's (Newtonian, Cassagrain, and Refractor)
- Learn the fundamentals of long exposure photography including types of filtration systems
- Troubleshoot photographic problems such as aberrations, star streaks, and light halos
- Learn how to polar align and fix tracking problems with PHd software.

### **COURSE MATERIALS:**

Textbook: *Getting Started with Astrophotography. Allan Hall*

Stellarium software: Free Download from Web (starmapping), will be utilized for class activities.

Backyard EOS tracking software for laptops

PHD2 Guiding software for guide scope tracking

### **GRADED COURSE ACTIVITIES**

**Attendance: (25%)** Students will be expected to be in class for all instructional activities per week in order to understand the complex operations of the equipment and concepts. Medical leave will be excused with physicians notice.

**Photography Time:** Students will need night time availability to work on their photography. They should plan on at least 3 to 5 nights being at the college after dark. They should also plan on set up and tear down of the scopes.

**Projects: (50%)** Students will be expected to produce photographs of the Sun (using our solar scope), the moon (digital with highlights of certain features), A planet, and one deep sky object. At least one of the pictures will be blow up to 36 X 36 and framed for display in the science center.

**Final Assessment (25%)** Students will be assessed on their familiarity with the cameras, software, and telescopes at the end of course exam.

*Complaints and Comments on Graded Work:* *A student must wait 24 hours to discuss with me a complaint or grievance regarding a graded piece of work. Office hours or a rescheduled meeting time is the only time I will talk to a student about graded work.*

Grades on examinations and the final grade for the course are determined by the following percentages:

(90- 100%) = A	(80- 89%) = B
(70-79%) = C	(60- 69%) = D
(0- 59%) = F	

**Instructional methods:** Lecture and notes review, discussions, and laboratories. Audiovisual aids used by the instructor include eraserboard and LCD projector. Word documents, instructor-drawn diagrams, web-based diagrams and informational sites are referenced by projector. Tutors may be available at Student Support Services.

**Attendance policy/Class procedures:** Students need to attend regularly to gain full benefit of instruction and receive full credit for homework and quizzes. **Homework and laboratories cannot be made up**, although one or two of these grades are dropped in the final grade calculation. There is no determination of excused/unexcused absence status; the number of days absent is reported to Student Services. Attendance (or lack of it) can affect financial disbursement; the Financial Aid committee can be consulted if there is a question on the part of the student. Absence from an examination is not advantageous to the student; the student must arrange a makeup exam time convenient to the instructor **within one week**, or the grade becomes a zero.

#### **General classroom policies:**

**Cell phones:** Try to turn off cell phones during class; other students have a right not to be distracted. The student should tell his/her family to call Student Services if there is an emergency, and the office workers can come and get the student. If the student insists on taking calls, the phone should be on vibrate and the student should leave class for the call.

**Excessive talking:** Every now and then there are students who like to talk away during class. Why they pay good money and take the time to attend and then not listen is a mystery worthy of a research project. Excessive talking is a distraction to other students and the hapless victim that has to sit and listen to the talker. If the problem persists there will be a meeting with myself and the department head and then on to the academic dean.

**Texting:** Everybody here is an adult- they can drive, join the army and sign binding contracts. Since when does informing your buds every two minutes what you're up to become more important than your job prospects? (Education = jobs = economic status for life). You may think I'm the **nice** instructor because I don't get after you for texting- the truth is that (1) I probably am not aware of it, (2) I did not earn advanced degrees to become the text police and (3) I'm going to let you make adult choices and maybe pay a heavy adult price- bad grades and possibly doing it all over again! Who is the nice guy now?

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**Class Timetable:** See *Canvas Calendar* for list of dates for various activities in class

Week	lecture	Lab
1 Targets in the sky	Use of Stellarium- to understand the coordinate system, observation techniques and ethics, and tools	
2 Understanding the telescope	Understanding focal lengths, apertures, types of OTA's, eye-pieces, guide scopes,	Designing our pins
3 Understanding your camera system	How to attach your camera, adjust settings, tricks to long term exposure and collecting light.	Night Lab open for sky watching and getting familiar with the scopes.
4 Working with the tracking software	How to work with equatorial mounts, EOS, and pH guide programs. Understanding Periodic Corrections	Night Photography Lab open for Moon photos
5 Working with your filters	Looking at light through different filters, polarization, contrasts, data reduction, noise	Day lab open for solar photo
6 Editing your images	Using photoshop software to clean up images and produce labels	Night Lab open for planetary photos
7 Printing your image	Flex time for printing and editing of student photos, Hand out review for final	Night Lab open for deep sky image photos
8 Final	End of Course Exam, Photography gallery walk for grades	



2002 Seeing Double.jpg



2003 The Great Celestial ARC.jpg



2004 Advanced Bino.jpg



2004 Bino from Hel.jpg



2004 Starlight Starbright.jpg



2005 2006 Eye in the Sky.jpg



2005 Bright Sky.jpg



2005 RegularBino.jpg



2007 Be a SAP.jpg



2008 Globular Glory.jpg



2009 SX5.jpg



2010 About Face.jpg



2011 Lions Tigers Bears.jpg



2011 Regular Bino.jpg



2012 is 2012.jpg



2013 nodots.jpg



2014 zombie.jpg



2015 Living Color.jpg



2016 xr.jpg



2017 Deja Vu.jpg



2018 Stinking Planetaries.jpg

**BIOL 299/399 Special Topics** is a course designed to focus on specific topics in biological, environmental, or natural resources. The credit hours will depend on the instructor, the length of time of course meets, and whether or not a lab is required. The prerequisite will vary depending on the special topic.

During the second eight weeks of the fall semester, I would like to instruct a **four credit, hybrid special topics** course on **Cancer Biology** (pre-requisite BIOL 150). One or more of the secondary education students need an advanced biology course (BIOL 399) to meet graduation requirements. The course, as a 200 level course (BIOL 299) will also be open to any TMCC student who has completed the prerequisites. The course may be audited by students, faculty, or staff who have not completed the prerequisites but are interested in learning about cancer biology.

The course will involve in-class lectures and specific journal article reading and discussions. In the hybrid part of the course, reading assignments and researching the scientific journals for reports and reviews on cancer ranging from specific cancers, new cancer treatments or research studies involving new treatments. The students will write and submit a research report for each topic investigated. The research reports will be presented as power points to TMCC faculty, staff, and students, and open to the Turtle Mountain community.

At the completion of the course, the students will have a very good understanding of the cancer process, why some cancer are increasing while others are decreasing in the human community, and the role of chemicals, stress, and the environment in increasing cancer risk

I have selected three primary texts for use in the course.

**1. *The Immortal Life of Henrietta Lacks*. 2009.** Rebecca Skloot. Crown Publishers

*The Immortal Life of Henrietta Lacks*, will be used as the introduction to cancer biology. Henrietta Lack donated (misinformed) the first human cancer cells that survived growth *in-vitro* (outside the body) in 1951. Henrietta did not survive the cancer and died in 1951; her cells survived. The cancer cells, called HeLa cells, are still growing today and are used in research to provide valuable information on human cancer. Her have resulted in a multi-billion dollar industry; Henrietta's family never received a penny from the sale of her cells and the research that followed; her family lived in poverty.

Throughout the lectures, we will discuss the ethics and unethical use of HeLa cells in research and the information scientists learned about cancer and cancer treatments. For example, HeLa cells were injected into terminally ill patients, without their permission, to determine if human cancer cells would cause cancer when transmitted to other humans; the injected cells resulted in cancer developing in the patients.

**2. *The Basic Science of Oncology*, 4<sup>th</sup> Edition.** 2005., Ian F. Tannock, Richard P. Hill, Robert G. Bristow, Lea Harrington, Editors. McGraw-Hill Medical Publishing Division.

*The Basic Science of Oncology* text is a series of review articles that address multiple cancer issues, including:

- a. Cancer epidemiology – once an article is read and discussed, the students will be required to research a cancer epidemiology topic on-line. Potential projects include:
  - Rapid City, SD has one of the highest rates of multiple myeloma than any state or city in the U.S. Why?

- North Dakota, Montana, and Minnesota are referred to as the lymphoma belt
  - Relationship between age and cancer
  - Relationship between the type of cancer and gender
  - Relationship between the type of cancer and location.
- b. Viruses and cancer – many type of childhood leukemia are due to virus infections
  - c. DNA repair and genomic stability
  - d. Cell proliferation and tumor growth
  - e. Cellular, molecular, and microenvironmental factors involved in tumor progression
  - f. Hormones and cancer
  - g. Cancer and the immune system

**3. *Cellular and Molecular Immunology*, 9<sup>th</sup> Edition. 2017. Abul Abbas, Andrew H. Litchman, Shiv Pillai. Elseiver**

Many cancers are due to mutation in cell signaling pathways. The *Cellular and Molecular Immunology* text provide updated information on how cell-signaling pathways work in the cell and how disruption of a signaling pathway can lead to multiple diseases, including cancer. Specific cell-signaling pathways and disruptions in the pathway are discussed. An example is CD19, a cell signaling protein present in the cell membrane of T<sub>helper</sub> immune cells. The normal function of CD19 is to initiate a signal pathway in the T<sub>helper</sub> cells that will result in a signal protein being synthesized and sent to another cell of the immune system, the B cells. The T<sub>helper</sub> cells synthesized signaling protein induces B cell replication and antibody production, after binding to B cell. A mutation in CD19 in T<sub>helper</sub> cells can result in the overproduction of the B-cell signaling protein leading to B-cell over-replication, resulting in a B cell form of cancer, not a T<sub>helper</sub> cell form of cancer.

The health of the immune system is very important to cancer survival. The role of the immune system in screening the body for cancer cells and destroying the cancer cells is presented in the text. The techniques that have recently been developed and are still being developed are also discussed in the text.

In addition to these three texts, chapter from other texts and current review articles on cancer will be provided.

There are currently three student definitely interested in taking the course; two are secondary education students and the third is planning on going into secondary education. I will not discuss the course with non-education students until the course is approved.