

SYLLABUS
PHYS 110 – Introductory Astronomy (3 credits)
Fall 2020
Dr. Scott A. Wood
Days/Time: Tue, Thu 2:00 – 3:15 PM
Location: **Gate City Bank Auditorium**

Office information:

Office: 201 S Engineering

Office hours: Via teleconference only. Regular hours: Mon. 9-11 AM, Tue noon-1:45 PM, Fri 10 AM-noon. Also by appointment.

Email: scott.wood@ndsu.edu E-mail is by far the best way to reach me. Note that I will generally respond to e-mail within 24 hrs during the workweek (48 hrs on the weekend) but will not generally respond before 8:30 AM or after 5:00 PM on weekdays, unless it is a dire emergency.

Course Format: Even prior to the emergence of COVID-19, it was intended that this course would be offered in a flipped classroom environment. This means that students are responsible for reading the text and viewing pre-recorded lectures on-line via BlackBoard prior to coming to class and class time is devoted to active learning activities and/or mini lectures focused on particular aspects of the material that require more explanation. In light of COVID-19, the course is now being taught under the so-called HyFlex model (but still also using a flipped classroom model). In the HyFlex model, students who wish to do so, may attend the live class in **Gate City Bank Auditorium** on Tuesdays and Thursdays at 2-3:15 PM. The classroom is large enough that students who attend live should be able to practice social distancing. Students who are sick or feel uncomfortable attending the live class for any reason may participate *synchronously* with the class via BlackBoard Collaborate on the above days and times. *In either case, because I and members of my family are considered to be in a particularly vulnerable class vis-à-vis COVID-19, I will interact with the class remotely via a video and audio feed. In other words, I will not be physically present in the classroom.* In addition, if a student for some reason cannot attend the live class or participate synchronously on-line, that student will be able to view recordings of the class sessions *asynchronously* on line via BlackBoard Collaborate. Whether you attend the live class, participate synchronously on line, or view the class sessions asynchronously, every week you will have readings and pre-recorded lectures to view/listen to, homework to complete, and comprehension check quizzes to take, all of which will be on line using BlackBoard. The mid-term and final exams will also be administered on-line via BlackBoard. More detail on homework, quizzes, exams, etc. will be provided below. My office hours and any student appointments will be conducted via BlackBoard Collaborate or Zoom.

In the event that the COVID-19 situation worsens, forcing discontinuance of live lectures, the only change in the course necessary will be that ALL students would need to participate in the class on-line either synchronously or asynchronously. It is to be noted that although the asynchronous on-line option will always be available, it is highly recommended that students participate either live or synchronously on-line whenever possible.

Course Description: Qualitative (mostly) survey of past and current scientific understanding of the universe including constellations, planetary explorations, stellar evolution, galaxies, and origin of the universe. There will be a focus on the physical mechanisms behind star structure, planetary formation, and evolution of the universe. While you will be required to work with some equations and do some simple calculations, the level of mathematics required will be simple arithmetic and high-school algebra (plugging numbers into equations, rearranging simple equations, use of logarithms and exponents). Occasionally in the text or lecture material some basic geometry or trigonometry will be used but students will not have to employ these branches of mathematics. No calculus or higher mathematics will be used.

PHYS 110 has been approved for the Science and Technology category of the General Education requirements. Through active and engaged participation in this course students will be able to:

- *Comprehend concepts and methods of inquiry in science and technology, and their applications for society* (Outcome 5)
- *Integrate knowledge and ideas in a coherent and meaningful manner* (Outcome 6)

Course Objectives: The goal of this course is to provide students with knowledge and understanding of the basic principles of science and astronomy. Additionally, this course will help students attain an appreciation for the impact of astronomy on our society, history, and progress of the other sciences. By the end of the semester, successful students will be able to:

- 1) Describe and explain major concepts and theories in astronomy.
- 2) Evaluate evidence and arguments in astronomy and science more generally.
- 3) Distinguish science from pseudoscience.
- 4) Analyze data and interpret their meaning.
- 5) Describe major events in the history of astronomy and relate those to the development of modern astronomy.

Prerequisite: High-school algebra.

Text/Course Materials: No matter which option you are using to participate in the class sessions, you will need access to a computer with an internet connection so that you can access BlackBoard. If you will participate in the class sessions in the on-line synchronous mode, your computer will need to have a functioning microphone and ideally a functioning video camera.

As far as a textbook is concerned, I have selected an e-book that also provides you access to an online homework system and other learning resources. The title of the e-text is *Horizons: Exploring the Universe*, 14th edition by M. Seeds and D. Backman and it is published by Cengage Learning. You will be able to access the content the first day of class in Blackboard. The cost of your Inclusive Access item has been reduced to below-market prices and will be billed to your student account during the first week of class. Watch your NDSU email for more details closer to the start of the semester!

Those attending classes live should bring to class every day several blank sheets of paper, a writing implement, and a device with a calculator. Those participating on-line will also have to have the equivalent handy to participate in the activities.

Course Outline:

The weekly schedule and topics to be covered are given below.

Week 1 (Aug 24 – 28): Here and Now (Chapter 1)

Week 2 (Aug 31 – Sept 4): A User's Guide to the Sky (Chapter 2) and Cycles of the Sun and Moon (Chapter 3)

Week 3 (Sept 7 – 11): The Origin of Modern Astronomy (Chapter 4)

Week 4 (Sept 14 – 18): Light and Telescopes (Chapter 5) and Atoms and Spectra (Chapter 6)

Week 5 (Sept 21 – 25): The Sun (Chapter 7)

Week 6 (Sept 28 – Oct 2): The Family of Stars (Chapter 8)

Week 7 (Oct 5 – 9): The Formation and Structure of Stars (Chapter 9)

Week 8 (Oct 12 – 16): The Deaths of Stars (Chapter 10) **** Boss Battle 1 ****

Week 9 (Oct 19 – 23): Neutron Stars and Black Holes (Chapter 11)

Week 10 (Oct 26 – 30): Modern Cosmology (Chapter 14)

Week 11 (Nov 2 – 6): Origin of the Solar System and Extrasolar Planets (Chapter 15)

Week 12 (Nov 9 – 13): Earth and Moon: Bases for Comparative Planetology (Chapter 16)

Week 13 (Nov 16 – 20): Mercury, Venus, and Mars (Chapter 17)

Week 14 (Nov 23 – 27): The Outer Solar System (Chapter 18)

Week 15 (Nov 30 – Dec 4): Meteorites, Asteroids, and Comets (Chapter 19) **** Boss Battle 2 ****

Week 16 (Dec 7 – 11): Astrobiology: Life on Other Worlds (Chapter 20) Dead Week

Finals Week (Dec 14 – 18) **** Final Boss Battle *****

Communication: Email correspondence should be considered the formal means of communication for this course. Please be aware of your tone, grammar, and sentence structure. Messages should include a salutation, e.g., “Hi Dr. Wood” but *not* “Hey” or “Dude”. Messages will be responded to in a timeframe as indicated at the beginning of this syllabus. In return, I expect a similar response time from you when contacted. All email messages should include ‘PHYS 110’ in the subject line. Messages that do not conform to the above criteria will be ignored. For more information on effective emails, see <http://bit.ly/2bJzgiK>

Emails to Dr. Wood should be reserved for *specific grade-related concerns or personal issues*. General questions about how the course operates (logistics) or about course content should be posted to the *Question and Answer Discussion Forum* (Q&A Forum) on BlackBoard. This is located on the Assignments page. I will respond to your posts on the forum so that your peers can benefit from seeing the responses. In addition, your peers may post a reply if they are able to answer a particular question. If you have a question that is the same as one that has been posted on the Q&A Forum, please wait for Dr. Wood (or a student) to respond. **DO NOT** send an e-mail with the same question. Also, **DO NOT** post the same question on the Q&A forum more than once (this means that if you have a question, make sure that the same question hasn't already been posted).

Technical Support: If you need assistance logging onto BlackBoard or any other NDSU account that you may need to access for this course or if you have any other technical computer questions, you are directed to contact the Information Technology staff via the HelpDesk

(ndsuhelpdesk@ndsuh.edu, 701-231-8685). If they cannot help you, they will be able to direct you to someone who can. You should contact Dr. Wood with questions about how to navigate the BlackBoard site for the course once you are logged in.

Learner Assessment (or how you will earn a grade in this course): We will use a GAMEFUL LEARNING approach in PHYS 110, which has the following features:

- *Earning up:* During the course, you'll attempt missions and challenges to attain success. You earn experience points (XP) after successfully completing course tasks. Each accomplishment, whether small or large, earns XP so you can level up.
- *Increased autonomy:* As the learner, you choose how to demonstrate learning and how you want to engage with the course content. There are multiple missions and challenges that offer you different ways to interact with course content. You decide how you'll earn XP and level up!
- *Freedom to fail:* Your final grade won't suffer if you take risks. If you fail a mission or challenge you'll be able to complete other tasks to earn XP. In addition, you will be able to revise and resubmit your work for some, but not all, missions and challenges.
- *Tangible progress:* You can see your progress as you gain experience and reach levels. It's just addition: add up your XP to see how far you've leveled up.

XP Required	Level	Grade Equivalent
20,000 XP	PI (principal investigator)	A
17,000 XP	Post-doc (post-doctoral researcher)	B
15,000 XP	PhD student (doctoral student)	C
12,000 XP	URA (undergraduate research assistant)	D
< 12,000 XP	Non-scientist	F

**** **Missed Deadlines** ****

Submitting late work is unacceptable! Deadlines for missions and challenges are discussed in class and posted well in advance. Thus, all course work must be submitted by or before the deadlines to earn XP. You may submit work early. Technical issues or loss of Internet connection are not acceptable excuses for submitting late work. Plan ahead! In addition, because there are many different ways to earn XP and because no one should wait for the last minute to submit an assignment, I will also not typically allow work to be made up if a deadline is missed due to a short-term illness (e.g., 1 day) or other absence. However, exceptions may be made for cases where illness/absence lasts longer than a day or two.

How do you earn XP and level up? You earn XP by completing course tasks, both in and out of class. Course tasks are divided into two types: missions and challenges. Missions are core assignments for the course, and challenges require a bit more effort. See below for brief descriptions. All course tasks will be discussed in more detail in class or via BlackBoard.

Type	Task	Total Possible XP
Mission	Complete quiz on the course syllabus	200
Mission	Boss Battles 1 and 2; 2 possible; 4000 XP each	8000
Mission	Comprehension check quizzes; 16 possible; 100-200 XP each	2650

Mission	End-of-class retrieval practice; 20 possible, 200 XP each	4000
Mission	Final Boss Battle	4000
Challenge	Drop-in help; 10 possible, 250 XP each	2500
Challenge	Cengage Webassign HW; 18 possible, 120 XP each	2160
Challenge	Science in Media Project	5000
Challenge	Design Your Own (Science) Adventure; 2,000 – 5,000 depending on task	TBD
	Total XP:	28,510

Mission Descriptions

Brief descriptions of each mission are provided below. Details for each mission will be discussed during class and/or provided on BlackBoard.

<p>Course Syllabus Quiz (200 XP)</p> <p>Complete the quiz on the syllabus available on the Syllabus page of the BlackBoard site for this course. You may re-take this quiz as often as you like, but you must eventually get every question correct to pass the course. Deadline: Midnight on Friday, August 28.</p>
<p>Boss Battles (or tests of knowledge and skills) (8,000 XP – 4,000 each, 2 possible)</p> <p>Demonstrate understanding of core astronomy principles and quantitative reasoning skills. These will be administered via BlackBoard and you have just one attempt. You may attempt the Boss Battle at any time during the 24-hour period of the day of the Boss Battle. You may use your textbook, course lecture materials, and your own notes, but you may not consult/communicate with a living person during the test. Boss Battle 1 will take place on October 15 and Boss Battle 2 on December 3. We will not have a class meeting on those days and you will have from 12:01 AM until 11:59 PM on the test date to take the exam.</p>
<p>Comprehension check quizzes (2650 XP - 16 possible, 100-200 XP each)</p> <p>Each week you will take a quiz designed to test your comprehension of the reading/lecture material for that week. The comprehension check for each week can be found by clicking on Course Content and then the link for that week. Typically, the quiz for a given week will be made available on BlackBoard the week before it is due, and must be completed by 5:00 PM on Friday of the week it is due. Although you have until the end of the week to complete the quiz, it is highly recommended that you get in the habit of reading the relevant chapter(s), viewing the lecture videos, and attempting the quiz before class meets on Tuesday of the week it is due. This is to help you prepare for any in-class activities. You will be able to attempt each quiz two times and your highest score will be recorded. Each quiz will have between 10 and 20 questions worth 10 XP apiece.</p>
<p>End-of-class retrieval practice (4000 XP, 20 possible, 200 XP each)</p> <p>At the end of each of 20 class periods throughout the semester, the instructor will pose one or more question for you to answer in the last 5-10 minutes of the class. Those attending class live will write their answer(s) on a sheet of paper and hand it in to the TA. Those attending class on-line synchronously will send their answer to the instructor via e-mail within a few minutes of the end of class. Those who must participate in the class on-line asynchronously will need to submit their answer(s) via e-mail immediately on completion of viewing the video of the class session.</p>
<p>Final Boss Battle (4000 XP)</p>

This is a test similar to Boss Battles 1 and 2 in that it will be administered via Black Board over a 24-hour period on the day scheduled for the final exam for this course. Approximately 2/3 of the exam will be cumulative (i.e., cover material covered in Boss Battles 1 and 2) and 1/3 will cover material since Boss Battle 3.

Challenge Descriptions

Brief descriptions of each challenge are provided below. Details for each challenge will be discussed in class and/or detailed descriptions will be provided on BlackBoard.

Drop-in help (2500 XP - 10 possible, 250 XP each)

Work with Dr. Wood (remotely) during his published office hours (see above) or via appointment to review course content. You are encouraged to do this whenever you have questions or need a little assistance understanding the material, but you can only receive credit for 10 of these “visits”. To gain credit for these sessions, you must have a substantial interaction and make sure that Dr. Wood records your name. Simply showing up for office hours and listening to other students ask questions will not be sufficient to earn the points.

Cengage Webassign Homework (2160 XP - 18 possible, 120 XP each)

Along with your purchase of the e-text, you will have access to other learning materials on the Cengage website for the text. This includes practice HW questions and problems. Each book chapter has a set of HW that contains 12 questions. Because there are two weeks in which we cover two chapters, there are two weeks that will have two sets of homework. You will have two attempts to do each HW assignment and these assignments must be completed by midnight on the Friday of the corresponding week.

Science in the Media Project (5000 XP)

You will evaluate a scientific news article dealing with astronomy that has been published in the mainstream media and compare it to the original scientific research article.

Deadline: This project consists of multiple steps, and each step will have a separate due date. See BlackBoard for dates.

Design Your Own (Science) Adventure (2,000 – 5,000 depending on task)

Design your own project that aligns with the goals of the course. Dr. Wood must approve the scope of the project BEFORE you begin working on it.

Professionalism:

As a future professional, you should work to develop your **professionalism** while in college. Professionalism doesn't just happen; you must work on it. The “**5 Ps**” are helpful for guiding your professional growth:

- 1) **Be prompt.** I expect students to arrive on time to class (whether live or synchronous on-line) and submit work by the deadlines. Late work will generally not be accepted except in extenuating circumstances.
- 2) **Be present.** I expect student to NOT be distracted by devices and others during live class. If participating on-line, make sure your microphone is muted unless you are actually speaking and try as much as possible to participate from a location as free from distractions as possible (although I realize that this might not be possible in every case).

- 3) **Be persistent.** I expect students to persevere when the work becomes challenging and to seek out strategies to assist them in overcoming difficulties.
- 4) **Be personable.** I expect students to actively and respectfully engage with each other and me.
- 5) **Be principled.** I expect students to exhibit strong character, respect for others, and honesty at all times.

Attendance: According to NDSU Policy 333 (<https://www.ndsu.edu/fileadmin/policy/333.pdf>), attendance in classes (either in-person or virtually) is expected and important. Plan to attend every class session live or on-line synchronously and participate actively (see section on professionalism above). It is not entirely possible to make up many of the experiences missed in the live or synchronous classroom. It is understood that in the current circumstances of life with COVID-19 it may not always be possible to participate live or synchronously on-line, which is why the asynchronous option is also available. Again, it is important to attend live or on-line synchronous sessions whenever possible. Be proactive when communicating absences and contact Dr. Wood if you have concerns about attendance.

COVID-19 Issues:

Face-covering requirement

NDSU requires students and faculty to wear face coverings in classrooms. Wearing face coverings helps reduce the risk to others in case you are infected but do not have symptoms. The Dean of Students will be notified of non-compliant students. Individuals not wearing appropriate face coverings will be asked to leave the classroom. Students who need accommodation due to disability or who have accessibility considerations should contact Disability Services at 701-231-8463.

Well-being Resources on Campus and in the Community

As a member of the NDSU community, resources are available for you should you need help in dealing with adverse reactions to things happening in the world today. A variety of resources are listed below:

For students on campus and remotely (telehealth):

Counseling Services: 701-231-7671

Disability Services: 701-231-8463

Student Health Service: 701-231-7331

In a crisis or emergency situation:

Call University Police: 701-231-8998

Call 911

Go to a Hospital Emergency Room

Go to Prairie St. Johns for a Needs Assessment: 701-476-721 (510 4th St. S.)

Call the FirstLink Help Line: 1-800-273- TALK (8255) or 2-1-1

Call Rape and Abuse Crisis Center: 701-293-7273

Code of Academic Conduct:

- All work in this course must be completed in a manner consistent with NDSU University Senate Policy, Section 335: Code of Academic Responsibility and Conduct.
<http://www.ndsu.nodak.edu/policy/335.htm>
- Academic dishonesty in any of the exams or assignments can result in an **F** for the course, and could lead to additional penalties up to and possibility including suspension or expulsion.
- Informational resources about academic honesty for students can be found at www.ndsu.edu/academichonesty.

Americans with Disabilities Act:

Any students with disabilities or other needs who require special accommodations in this course should contact the NDSU Disabilities Services Office (<https://www.ndsu.edu/disabilityservices/>), 17 Main Library, but are also invited to share these concerns, in confidence, with the course instructor as soon as possible.

Veterans and service member statement:

Veterans and student service-members with special circumstances or who are activated are encouraged to notify the instructor as soon as possible and are encouraged to provide Activation Orders.”