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The History of Astronomy at Lehigh University, 1865-2018

Emily A. Mailhot
Lehigh University

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The goal of this document is not only to record in an organized fashion the time passage of astronomy at this institution, but also to fulfill a Senior Thesis requirement of a member of the 2019 Eckardt Scholars cohort.

The Lehigh University College of Arts and Sciences (CAS) Eckardt Scholars Program is the CAS honors program for undergraduates. The program is named in honor of A. Roy Eckardt (1918-98), previous chairman of the Department of Religion. It is described as a highly selective and unique honors program that emphasizes deep intellectual curiosity, independent work, and close mentoring relationships between the very highest achieving students and faculty. The program is flexible in course work, allowing students to develop opportunities that are not available to most others. Two Eckardt Scholar Seminars are required, as well as a large capstone project in the senior year. At the time of this Eckardt Thesis, "The History of Astronomy at Lehigh University", Augustine (Gus) Ripa is the Director of the Eckardt Program, and is also a Professor of Theatre.

The undeniably solid presence of astronomy at Lehigh seemed overlooked and poorly documented. Especially in the early years of the University, it's astronomical endeavors helped solidify America's scientific presence to the rest of the world. More than 150 years later it has continued to provide important advances in astronomy.

In this piece I aim to provide an unbiased documentation of all astronomical endeavors set forth by Lehigh. Much of the information is taken from documents that reside in the Special Collections Library, newspaper articles, and interviews with faculty. I have attempted to record the most correct information possible as was available.

I am indebted to my advisor, Dr. Gary G. DeLeo for his guidance and unending support in this enormous endeavor.

Yours,

Emily A. Mailhot
Class of 2019
Eckardt Scholar – B.S. Astrophysics
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Introduction

Lehigh University was founded by Asa Packer in 1865 with the mission, as summarized by its motto, “Homo Minister et Interpres Naturae”, “Man, the minister and interpreter of nature”. While the mission emphasized engineering and science, it held a strong classical component, as a liberal dose of the classics was required for all courses. Initially the undergraduate program was open only to men; women were first admitted into the graduate school in 1918, and later to the undergraduate program in 1971.

In order to get a full understanding of how astronomy morphed through time at Lehigh one must understand both the physics and math departments. This document organizes both departments and their relation to astronomy throughout the university’s history. Both the Department of Mathematics and Astronomy and the Department of Physics have separate, though incomplete, departmental histories. Some of the information in this history has been provided through those documents. Professor Joseph B. Reynolds wrote an in depth history of the Department of Mathematics and Astronomy covering the time from Lehigh’s inception until 1941. Professor James A. McLennan compiled a historical document of the Department of Physics that covered the early years of the University through 2002. Both documents were studied to find their associated relation with astronomy, and as might be expected some information from those documents has been has been reiterated and elaborated on here.

Lehigh's first class entered in the fall of 1866. The first president was Henry Coppée, who also taught as a Professor of History and English Literature. Among the first faculty members were Professors Dr. Edwin Wright Morgan, Professor of Mathematics and Mechanics and Dr. Alfred Marshall Mayer, Professor of Physics and Astronomy. The first Register lists thirty-nine students in the First Class. The current undergraduate class of 2019 boasts approximately twelve hundred students, the largest class to go through Lehigh. The current and 14th president of the University is John D. Simon, an internationally renowned chemist and respected leader in higher education. President Simon holds a vision of developing a community of engaged minds and active citizens for Lehigh students. In 2019 the Dean of Students Office declared they were dedicated to providing a student centered, co-curricular environment that enhances the academic mission of the University, and embodies the belief that learning is not confined solely within traditional classroom boundaries. Lehigh is committed to challenging students to broaden their worldview in a campus culture that respects individuals’ differences and also expand their horizons and make healthy, ethical decisions. A hallmark of the Lehigh operation is the creation of partnerships with students, their families, faculty, staff, and alumni that will assist in the development and transformation of students within a safe and healthy campus environment. This hallmark has been true since opening in 1865.

In 1865 the University was divided into “courses” whose subjects such as Mechanical Engineering, Classics, and Metallurgy resemble “majors” of study as see today. Various professor took hand in advising in the early years of few students. Initially the mechanical and civil engineers were handled by Dr. Morgan with help from Dr. Mayer who had all students take some type of astronomy class in their junior or senior year. One early Register provides a roster showing the teaching schedules of each

professor, and the classes taken by various students. Class times were listed as beginning at 9, 10, 11, 2, and 3, Monday through Friday, and 9 on Saturday. Two hours of physics were taken weekly by all students during their first three years, and seniors took two hours per week of astronomy. The early physics courses were based on Ganot's Treatise on Physics, and Dr. Mayer's lecture notes. The text for astronomy was Loomis' Treatise on Descriptive and Practical Astronomy. Topics of the astronomy class instruction extended into learning operations of various instruments and methods of surveying. One of those instruments included a 6-in Alvan Clark refracting telescope housed in the Sayre Observatory. Today Lehigh class start times have a far broader range in order to accommodate the growing number of students. Saturday classes are also no longer running. There are now more than a dozen astronomy classes and well established B.S. and B.A. programs in Astrophysics and Astronomy, respectively. An early Register notes an advanced course in astronomy and higher analysis was established requiring two years for its completion. It is adapted to the attainments of the graduates of this University, but is open to any one who may be prepared to pursue it. But this was only true for a short time. Today while there are individuals graduating in the physics graduate program with astronomy related theses, their degrees are still rewarded as in the subject of Physics. There are currently only two dedicated astronomy graduate courses available.

Throughout Lehigh's history there have been many social and academic clubs. It has been noted that in the late 1920's and establishment of mathematical and astronomical undergraduate societies under faculty directorship took place. The E.W. Brown Astronomical Society was founded in 1934, having interests in topics in astronomy and observatory visits. The members, besides having periodical meetings, would assist in holding "Open House" at specified times at Sayre Observatory for the edification of the public. Dr. Van Arnam was the faculty advisor. While E.W. Brown astronomical society no longer exists, an Astronomy Club and a Society of Physics Students chapter both exist on campus. Dr. M Virginia McSwain and Dr. Gary G. DeLeo are the current faculty advisors, respectively.

Sayre Observatory and Instruments

Sayre Observatory

The Sayre Observatory was erected in 1868 with a gift of $5000 from Robert H, Sayre, a University Trustee and a founder of the Bethlehem Iron Company, the precursor of the Bethlehem Steel Corporation. The gift covered the construction of the building and the acquisition of various instruments. Professor Alfred Mayor was tasked with overseeing it's deign and construction. The 1868 – 1869 Register states, "By the liberality of Robert H. Sayre, Esq. on of the trustees of the University, an Astronomical Observatory has been erected on the University grounds and placed under the care of the Professor of Physics and Astronomy (later changed to Professor of Mathematics and Astronomy), for instruction of students in Practical Astronomy." The ground upon which the Observatory stands, consisting of seven acres of land adjoining the original grant, were presented to the University by Charles Brodhead, of Bethlehem. There is rumor that during a dedication speech it was deemed that "as long as the University itself shall stand, so shall the observatory" Which could have a bit of truth as in 2005, rather than demolishing the building in order to accommodate a parking garage, the observatory was moved 300 ft from it's original location.

The Observatory initially contained a 6-in by Alvan Clark & Sons refracting telescope, a Zenith Sector by Blunt, a superior Astronomical Clock by William Bond & Sons, a Meridian Circle, and a Prismatic Sextant by Pistor and Martins. Later a Field Transit by Stackpole would be added. An engineer's transit and a sextant, by Buff and Buff were added in the 1920's. Students in practical astronomy would receive instruction in the use of the instruments and in actual observation. After a trolley car line was installed around 1920, the observatory was rendered useless from a research standpoint due to the vibrations emanating from the trolley through the ground to the observatory. In the late 1950's, early 1960's the telescope was removed while Dr. Van Arnam was away. For some time afterwards the Psychology Department used the building for its animal labs. Later it became the building for the Graduate Student Council and very recently became the building for the Lehigh Liners. Lehigh Liners is an outreach program through the Office of Development and Alumni Relations, where current Lehigh students serve as ambassadors for the university while calling undergraduate and graduate alumni, parents, and friends.

6-in Alvan Clark Refractor

The 6-in Alvan Clark Refractor was part of the 1868 gift from Robert H. Sayre. The refractor took about one year to complete and has 1869 inscribed on the brass cap of the eyepiece end of the tube. Alvan Clark & Sons was an American maker of optics famous for crafting the largest refracting telescope lenses in the 19th and 20th centuries. Alvan Clark and his sons, George Bassett Clark and Alvan Graham Clark, founded the company in 1846 in Cambridgeport, MA. Five times the company built the largest refracting telescopes in the world, ending ultimately with the Great Paris Exhibition Telescope if 1900, which was never used in practice. The largest to be used in practice

was the 40-in lens for the Yerkes Observatory in 1897, owned by the University of Chicago, which was continually operational until only recently was the observatory closed due to funding issues. The Lehigh Clark was originally all wood and brass, until the wooden tube became damaged and replaced with aluminum. It is rumored that the original tube was cut and used to create another telescope, which may reside with a Lehigh Valley astronomy club member, Stan Wilkes.

In an interesting story told by Dr. McCluskey, it was realized that the telescope was lost for a substantial amount of time. Apparently in the 1950's or 1960's while Dr. Ralph Van Arnam was the instructor of astronomy, he became ill for multiple days, keeping him from attending classes. Upon his return he found the telescope had been taken away and boxed up, but it's whereabouts unknown. This rendered the telescope lost, for nearly 50 years. In the book "Alvan Clark & Sons: Artists in Optics" published in 1996, which is a detailed listing of all Alvan Clark & Sons equipment, the Lehigh Clark is described as, "The complete instrument has since disappeared and may no longer exist". By a complete stroke of luck, Dr. DeLeo was shown a box in the Lehigh Adams St warehouse building in the early 2000's. This box had not only the tube but also the original Alvan Clark lenses and many other of the original instruments. Dr. DeLeo recalls rediscovering the gem of a telescope in a Lehigh storage building on Adams St, "There was this giant, wooden crate. The crate was covered with dust and dirt, and showed signs where other had pried it open through the decades, probably in search of some other artifact." DeLeo recovered the telescope and discovered how lucky it was that everything was still in working shape. The lenses were in separate wooden boxes, resting loose in the giant crate. "If the box had ever been tipped up, we could have lost the lenses. They would have come crashing down 6 feet". DeLeo said. For a brief time in 2004-2005 the telescope was cleaned and put on display among many other early astronomical equipment for the Planet Lehigh exhibition through Special Collections. Today it resides in a Lewis Lab room.

691 Lehigh

In December 1909 Rev. Joel Metcalf of Taunton, Mass., discovered a minor planet orbiting the Sun between Mars and Jupiter through his own photographic method. A minor planet is an astronomical object in direct orbit around the Sun that is neither a planet nor exclusively classified as a comet. At the time Professor John Ogburn, then head of the Department of Mathematics and Astronomy, noted this discovery. He also needed a thesis topic for master's candidate Joseph Reynolds. The pair asked Metcalf for his photographs of measured positions and offered to compute its orbit if Metcalf would grant the privilege of choosing a name. Reynolds produced the elements of the minor planet's orbit in his 1910 master's thesis, which was hand written and is kept in the Special Collections library. To honor Reynolds work Metcalf allowed the planet to be named "Lehigh", thus the designation 691 Lehigh. To understand the true importance of the number 691, one must know that numbers are given to every minor planet discovered, to have a three digit number means this was a very early discovery. For perspective the minor planet with the designation of number 1 is Ceres, which NASA spacecraft Dawn orbited in 2015 and is the largest of the minor planets. Today there are over 600,000 named minor planets.

In the Minor Planet Bulletin volume 27, 2000, pp. 27-28 it states the minor planet is 44km in length and has a rotation period of about five hours. Reynolds had determined the size to be "not more than 25 or 30 miles in diameter and possibly smaller with a year that is equal to about 5.2 of our years. It would readily seem as if one could travel around her on a bicycle" as stated in the Brown and White Vol XVII, May 13, 1910. For physical context, "It's visible most of the time, but you need a dark sky and at least a 12-inch telescope to see it," says Dr. DeLeo. "It's just a little brighter than Pluto. But you wouldn't be able to see anything but a point of light."

Most importantly Dr. Ralph Van Arnam is quoted in the May 1958 Lehigh Alumni Bulletin, "To the best of my knowledge and belief, a certain institution several miles down the Lehigh Rover from our campus does not have a planet named in its honor. Lehigh will indeed 'shine tonight.'"

Special Collections and Early Astronomical Works

At the 2018 Stellafane Convention I was honored to meet Owen Gingerich, an astronomy historian, after he gave a presentation for the Thursday Hartness House talks. The theme that year was "Antique Telescopes, Observatories, and Related Equipment". Upon seeing my Lehigh t-shirt his first words were, "They have an incredible rare astronomical works collection". Lehigh's rare books collection is so valuable it is recognized world wide as was evident in my chance meeting with Gingerich.

Among these early works in astronomy are first or rare editions by Copernicus, Brahe, Galileo, Kepler, Newton and others. Lehigh Special Collections has Nicolaus Copernicus's 1543, De Revolutionibus, a book that has an illustration with the first known representation of the Solar System with the Sun at the center. Lehigh also has the 1566 edition of De Revolutionibus. Tycho Brahe is well noted for his records of a supernova, identified by two-year long observations of the color and magnitude change of a "new star" in Cassiopeia. His works "Astronomiae instrauratae mechanica" 1602, and "Historia Coelestis" 1666 are also housed in the Lehigh library. Galileo's work, "Il saggiatore" 1623, containing one of the earliest printed drawings of the rings of Saturn, as well as illustrations of the phases of Venus is part of the collection. His work "Macchie Solari" 1612 has published sunspot observations from the summer of that year is also in the Special Collections. Johannes Kepler's work "Astronomiae pars optica" 1604 lays the foundation for modern geometrical optics, explaining for the first time how an inverted image is formed on the retina of the eye. He also clearly defined a light ray in this work. "Astronomia nova" 1609 is the first written presentation of two of Kepler's laws of planetary motion. Those laws being first, planets move in ellipses and that the sun is one of the foci and second, that the line between the sun and a planet sweeps equal spaces in equal times. Sir Isaac Newton's "Principia Mathematica" 1714 (a revised version) constructs that the universe is governed by natural laws, like gravity. Thus this book is one of the first written accounts of the universal law of gravitation. "Opticks" 1704 describes his invention of the reflecting telescope, it also discusses that the color white consists of a mixture of all colors as well as his finding that different colors are refracted to different angles. Peter Apian's "Astronomicum Caesareum" – "The Emperor's Astronomy" describes the mechanics of a geocentric universe, but during that time De Revolutionibus soon surpassed it. "Cosmographicus" 1524 is Apian's maps, which is largely based on astronomy and mathematical geography, as well as "Cosmographia" 1550. Ptolemy's "Sacratissime astronomie" 1509 also resides with Lehigh. His astronomical theories were the most influential for Copernicus in the 16th century. "La Galla" a 1616 work by obscure 17th century Italian philosopher Giulio Cesare includes the word "telescopii", which is one of the earliest appearances of "telescope" in a published work. Robert Record's work "The Caste of Knowledge" is a treatise on the sphere and on Ptolemaic astronomy. It is written in the form of dialog between a master and a student and mentions Copernicus's heliocentric theory. Besides just astronomical works the Lehigh Special Collections has many other rare books available to browse. A 1638 volume by Galileo was the Lehigh University's library System will receive its one-millionth volume, acquired in September of 1992. These works are available to visit through email with the Special Collections office.

Professors

Lehigh first president, Henry Coppee once stated, “The place of mathematics in education is fundamental” and at the time this included astronomy. Two of the five inaugural faculty members were titled, Professor of Mathematics, Mechanics, and Engineering, and Professor of Physics and Astronomy.

Alfred Marshall Mayer was the first Professor of Physics and Astronomy. Mayer was born in Baltimore in 1836 and did not have any formal college education. At a young age he took upon himself to learn about the sciences developing and by age 21 was giving lectures in physics and chemistry at the University of Maryland. He was then appointed Professor of Natural Sciences in Westminster College, Missouri. He did eventually earn a PhD at Pennsylvania College. While at Lehigh he organized an expedition to study the August 7, 1869 Solar eclipse in Burlington, Iowa. Photographs taken during the eclipse were published in the Journal of the Franklin Institute and the Report of the Nautical Almanac Office. The solar eclipse expedition was the first scientific expedition of any kind for Lehigh. The telescope used was a refractor with an aperture of 6.24" borrowed from the Central High School of Philadelphia. Mr. Zentmayer of the Longacre Co. constructed a shutter consisting of a spring-driven plate containing a slit, which gave an exposure of 0.002 second. The time of each exposure was accurately determined with a chronograph. Forty-one pictures were taken, including four during the eighty-three seconds of totality, and this was considered to be remarkable in the days of wet-plate photography when each plate had to be prepared shortly before exposure. Mayer returned home, measured the plates to extract data on solar spots, prominences and other features, prepared two manuscripts, the major report being twenty-eight printed pages, and the two papers appeared in print in October, two months after the eclipse.

During his time Robert H. Sayre gave a donation for the construction of the Sayre Astronomical Observatory, which housed a 6-inch Alvan Clark, among many other instruments. Mayer published “Observations on the Planet Jupiter” in the Astronomical Register in 1870, which is likely to be one of the first publications that utilized the Alvan Clark. In 1871 Mayer accepted a professorship at the newly opened Stevens Institute of Technology. Nevertheless his tenure at Lehigh was productive and significant; "for the first time in his life, he became master of a well-equipped laboratory, and under the stimulus of favorable surroundings he plunged enthusiastically into experimental researches, especially in the fields of electromagnetism and astronomy." During this four-year period he published twelve papers and a book, and evidently established a substantial reputation as the year after moving to Stevens he was elected to the National Academy of Sciences. His obituary in the Physical Review begins with: "Among American physicists devoted to pure science few have become so distinguished as the one whose death we are called upon now to record."

In 1870 Mayer made observations of an aurora, which reached as far south as Bethlehem, finding correlations of activity in the aurora with the declination of a magnetic needle on the ground. This was a period of considerable solar activity and he also made measurements of the size of sunspots. There were other aurora in the same month and apparently at least one prior to the reported observations; he commenced measurements of magnetic declination five minutes after sighting the aurora, indicating

that he had prepared for it.

Hiero B. Herr took the title of Professor of Mathematics and Astronomy, which is the first indication of organization at the Department of Mathematics and Astronomy, from 1871 to1874. A West Point graduate he resigned from his U.S. Army commission to accept professorship at Lehigh. Faculty and students held Herr with very high respect, evident in a speech from the Lehigh Journal made by A. E. Meaker, who taught mathematics and astronomy at Lehigh for 35 years after his time as a student. "Whereas, Professor H.B. Herr who has been identified with the Lehigh University as one of its most efficient officers and teachers has tendered his resignation to the Board of Trustees; therefore, resolved, that we, the students of the Lehigh University express out sense of the loss the institution sustains by the resignation of an officer who has always had its best interests at heart and who has done so much to give it its present position among the colleges of our land, and especially our sincere regret as students, at the departure of a professor who has combined in an exceptional manner the most thorough instruction and strictest justice with the kindest feeling and sympathy towards those who be instructed, resolved, that we convey to him our best wishes for success and for the happiness of himself and family in the new sphere into which he is entering and our conviction that such success must follow his strict performance of duty and uprightness of character.

Not much is documented on his work at Lehigh, but he did have many classes to teach and prepare for, as well as observatory lessons.

Charles L. Doolittle was the Professor of Mathematics and Astronomy from 1874 to 1895. He was born 11/12/1843 in Ontario, Indiana. He had just graduated with a degree in Civil Engineering from University of Michigan, where he was a student of astronomy under J.C. Watson. He did not complete his degree at Michigan until after the Civil war, as he had served under Boss on the United States Northern Boundary Commission. He entered Lehigh in 1875 and subsequently lost his wife, leaving him with two young sons, Alfred and Eric. His sons would later graduate from Lehigh in 1887 and 18991, respectively, and each served one year under their father as Instructors in the Department of Mathematics and Astronomy. Doolittle married Helen E. Wolle, sister of the famous Founder of the Bach Choir. In 1895 he would resign from Lehigh to move onto Professor of Mathematics and Astronomy at University of Pennsylvania. He passed on March 3, 1919. He devoted a great deal of time to taking over 12,000 observations with a zenith telescope, bearing upon the problem of variation in latitude. Students referred to him "Poppy Doo" and in the Brown and White of June 13, 1895 it is stated, "the students as a whole felt they were to lose one whose place could not be filled". The zenith telescope was not the only addition to the department Doolittle made. During his 21-year of service numerous mathematics and astronomy books were bought or donated, as well as geometric models, an astronomical globe, and a model of the planetary system. It was during Doolittle's time that announcement of degrees of M.A., Ph.D., and Sc. D (1879) were first made. M.S. was added in 1883, but all these degrees were dropped in 1896. The announcement was as follows: "An advanced course in Astronomy and the higher Analysis has been established requiring two years for its completion. It is adapted to the attainments of the graduated of the University, but it open to anyone who may be prepared to pursue it. The course embraces the following subjects: First Year – Spherical

Astronomy, Theory of Instruments, Methods of Least Squares, Numerical Calculus. Second Year – Celestial Mechanics, Interpolation and Quadrature, Computation of Orbits and Perturbations".

It was about the year 1885 that Dr. Karl Kustner, of Berlin, found that certain anomalies in astronomical work he was doing could only be accounted for by assuming that the position of the poles was a variable quantity. This was a revolutionary statement and the scientific world seeking a confirmation of this theory found the work done at the Sayre Observatory perfectly adapted to substantiate the claims of Dr. Kustner. Dr. S.C. Chandler, an authority on theoretical astronomy and Editor of the Astronomical Journal of Boston, in the issue of August 23, 1892 says: "Professor Doolittle must be regarded as a pioneer in this subject, having devoted himself to it years before the reality of latitude-variation was generally regarded as possible. The accuracy, homogeneity and continuity of his observations make the series the most valuable of any we possess. As a 'by-product' of the last series a determination of the astronomical "constant of aberration" can be deduced for each year's work. The earths distance from the sun, which is the unit of astronomical measurement, is determined directly from this constant of aberration. The importance of this constant is therefore evident. For a hundred years a value of 20.44 arcseconds had been regarded as classical. The results at Sayre Observatory indicated that this value should be nearer 20.52 arcseconds, corresponding to a greater distance from the sun by nearly 300,000 miles. This new value has been confirmed by other observatories and also by work carried on at Sayre."

Charles Lewis Thornburg was born in Barboursville, W.V. on April 17, 1859. He graduated from Marshall College in 1876, taught two years in public school, and then went to Vanderbilt for degrees B.S., B.E., C.E., and PhD. From 1881 to1884 he was a Fellow and Graduate in Mathematics at Vanderbilt and later became instructor In engineering there. In 1886 he became Adjunct Professor in Engineering and Astronomy, which he held until coming to Lehigh in 1895. He doctor's thesis on "The Determination of the Transit of Venus" is contained in a report to the U.S. Naval Observatory. He is the author of numerous articles in the Astronomical Journal and of two small textbooks: " Calculus Notes" and "Elementary Differential Equations" both of which were used for Lehigh classes. In 1910 he was in charge of the Lehigh University Eclipse Party to Ahoskie, N.C. consisting of himself, Professors Mansfield Merriman Head of Civil Department and W.S. Franklin Head of Physics Department at Lehigh. Their observations of time of contact, shadow bands and drawings of the corona were published in a special volume of the U.S. Naval Observatory. He was Secretary of the Faculty from 1899 to 1923 continuously except in 1900-1901. This meant he had much to do with the educational policy of the institution, the making and enforcing of rules, the building of rosters – the bulwark in the maintenance standards of the University.

When he arrived at Lehigh he had two instructors at his disposal, Meaker and Lambert. He brought on J.H. Ogburn with his out of Vanderbilt. For 17 years these gentlemen grew the departure by huge amount. In 1895 there were 415 students, in 1912 upon Meaker's retirement there were 672, in 1925 when Lambert died and Thornberg retired there were 1465, and in 1939 when Ogburn retired after 44 continuous years there were 2149 students. This could be due to the fact that Thornburg ran his department in an almost military manner. Instructors got their orders from the Departure office bulletin

board; the students got their grades from the department public bulletin board. There was never any meeting of the department to discuss policies or procedure. He had a few words with his teaching corps. There was a maximum of formality and a minimum of spontaneity, but things ran like clockwork.

John Hutchinson Ogburn was born in Springfield, TN on December 22, 1868 and graduated with a Civil Engineering degree from Vanderbilt in 1892. He spent two years as an assistant astronomer at Dudley Observatory in Albany, NY where he became authority on the Minor Planet 387. Once at Lehigh, he found little time to devote to astronomy due to the intense teaching schedule, but soon began to cooperate with Doolittle at Flower Observatory on the investigation of variation of latitude. In 1904 Robert H. Sayre made a gift of a new zenith telescope and an annex to the observatory, to which Ogburn put in long, arduous hours taking and reducing observation. The University published this work in 1907 as "Astronomical Papers Part I, Vol I, Results of Observations with the Zenith Telescope of Sayre Astronomical Observatory, from Sept. 11, 1904 to Sept. 1, 1905". It consisted of 1207 determinations of latitude and partially confirmed the result of care and painstaking effort. Dr. Joseph Barrell, of Yale, in "American Geographic Magazine" for November, 1907, says in part: "The precision of modern astronomical work is remarkable when we find that an observer, as Professor Ogburn has done, can locate by observation on stars the position of his instrument at Sayre Observatory within a distance of less than two feet in one night's work, and this in face of the fact that his duties as instructor in the University consume several hours a day, to which must be added the additional work of reducing the instrumental observations which takes an average of six hours computing to each hour of observation." This work was carried on for six consecutive years with a total of 4370 determinations of latitude, when the construction of a street railway line passing within less than 100 feet of the observatory impaired the astronomical work so seriously as to make further results practically valueless from a scientific standpoint. In 1912 he gained full professorship at Lehigh for spent over 15 years in charge of work in astronomy at. During this time juniors in Math and Civil studied General Astronomy and Elective Practical Astronomy. From 1899 until 1913 only three graduate courses were offered; Practical Astronomy, Analytic Mechanics, and Differential Equations.

Joseph B. Reynolds was born near New Castle, PA, on May 17, 1881, got his elementary education in the country ungraded schools, his preparatory education in the New Castle High School and college education at Lehigh University where he was granted the degree B.A. in 1907 and M.A. in 1910. Moravian College granted him the degree, Ph.D., in 1919. He served at Lehigh as instructor, assistant, and associate professor and since 1927 has been professor of mathematics and theoretical mechanics. In 1908 he married Chloey B. Graham and is the father of two sons and a daughter. Reynolds Lehigh Master's Thesis was determining the orbital elements of the minor planet 691 Lehigh described earlier in this text.

Ralph Newcomb Van Arnam was born 6/7/1902 in Beaver Falls, NY was educated at Lowville Academy, Cornell, and Chicago Universities. He received an E.E. degree from Cornell in 1926 and M.S. in 1927. He has experience at Yerkes Observatory and

lead two solar eclipse parties through Lehigh. He has published four astronomical papers in various journals. He was assistant and instructor in mathematics and astronomy from 1926 to 1967.

Clarence Albert Shook was born June 11, 1895, in Akron, Ohio and was educated at the University of Akron, Western Reserve, Harvard, and Johns Hopkins Universities. At the last three of these he was granted A.B., M.A., and PhD., respectively, in 1916, 1918, and 1923. While he was an Associate Professor of only Mathematics at Lehigh he is the author of five mathematical and astronomical articles, and co-author with E. W. Brown of a book, "Planetary Theory". He was a second lieutenant in the World War,

George E. McCluskey Jr. was born on August 28, 1938 in Hammonton, N.J. His family moved to Montgomeryville, PA when he was about two years old and later moved to Lansdale in 1955. He and his wife now live near Bethlehem, PA. He earned his B.A. in Astronomy from the University of Pennsylvania in 1960. He then spent approximately ten months at the University of Arizona working towards his graduate studies but decided to return to PA. In 1963, he received his Masters from University of Pennsylvania and his Ph.D. in astronomy there in 1965. A few months after completing his Ph.D. he became an Assistant Professor of Astronomy in the Department of Mathematics and Astronomy at Lehigh University, which he held until 1968. He was promoted to Associate Professor in 1969 and promoted again to full Professor 1976. In the spring of 1966 he worked as an Adjust Professor at University of Pennsylvania's Department of Astronomy. During the summer of 1969 he was a Summer Technical Employee at the Manned Spacecraft Center in Houston, TX, yes during the moonwalk. The following year he was a Summer Professional Employee at the Manned Spacecraft Center, in Houston, TX, working on research on close binaries. He was a guest investigator for the Copernicus satellite form January 1973 – June 1976, working on x-rays and gamma rays from close binaries. He was also a Guest Investigator from January 1975 – January 1977 for the Astronomical Netherlands Satellite (ANS). From 1978 - 1987 was a Guest Investigator for the International Ultraviolet Explorer (IUE) Satellite associated with multiple NASA Research Grants. He had many NASA Research Grants from 1984 through 1994. From 1998 to 2000 he was the Chair of the Department of Mathematics at Lehigh University. And in 2002 moved along with all his astronomy courses to the Department of Physics. Throughout his entire career he and his research associate Y. Kondo authored many astronomical papers together, especially works on mass flow in binary stars.

Dr. McCluskey is ultimately responsible for keeping astronomy alive at Lehigh. Upon his arrival in 1965, with the telescope missing, interest waned. The moon landings helped McCluskey gain the approval of the department and students to create nearly a dozen astronomy courses into the mathematics curriculum. As the only astronomy professor McCluskey taught all of these courses, often overloading on courses while conducting his research. In the early 2000s Dr. DeLeo would approach McCluskey with a proposition to develop a Bachelor of Science in Astrophysics and Bachelor of Arts degree in Astronomy that would reside in the Department of Physics. They worked together to create what are the current astronomy courses and degrees, and Dr. McCluskey left the mathematics department to join physics along with the new degree program. McCluskey retired in 2015, after 51 years of teaching.

Gary G. DeLeo was born on the October 5, 1952 in Glen Cove, NY. After high school DeLeo pursued his undergraduate B.S. in Physics at S.U.N.Y. at Fredonia, finishing in 1974. Immediately following he received his M.S. and Ph.D. in Physics from the University of Connecticut, 1976 and 1979, respectively. DeLeo has been a devoted, productive, long time member of the Lehigh Physics Department. He started in 1979 as a Visiting Assistant Professor until 1982 when he became an Assistant Professor. In 1985 he became an Associate Professor until his full Professorship was granted in 1990. Only three years afterward he became the Associate Dean of the College of Arts and Science Dean James Gunton, also of the physics department. It was during this time that DeLeo became the Director of the Science Outreach program, which he estimates he has run approximately 1600 programs with nearly 50000 attendees. In 2000, the same year his time as Associate Dean ended, he went on to Chair the department of Physics until 2003. He most recent position, Associate Chair just came to a close in 2018 after having served since 2007.

DeLeo's early research was that of the theory of defects in semiconductors and insulators. Spending much of his time on electronic structures, electron-lattice interactions, molecular-dynamics, and optical properties of defects. His more recent work is well aligned with astronomy and astrophysics, especially the theory of binary-star systems, mass flow and ultraviolet spectroscopy of interacting binary stars, and orbital analysis of visual binary systems. Around the time of his spark of astronomical research, though interested in astronomy and space travel all his life, is when he and Professor McCluskey began playing with the idea of an Astronomy and Astrophysics degree program within the physics department. Around this time is also when he rediscovered the Alvan Clark and worked towards creating an exhibition for the antique piece. Thie exhibition was named "Planet Lehigh" which ultimately highlighted the work surrounding minor planet 691 Lehigh, but also included many instruments used during the early Lehigh astronomical years.

M. Virginia "Ginny" McSwain is originally from Macon, Georgia. She earned her B.S. in Physics at the Georgia Institute of Technology in 1999 and went on to earned her M.S. in Physics in 2001 from the Georgia State University. Her Ph.D. in Astronomy was also at Georgia State University and her thesis: Evolution of Massive Stars: The Be Star and Micro quasar Phenomena was completed in 2004. While in graduate school she was an MCAT Physics Instructor for The Princeton Review and a Graduate Teaching and Research Assistant for the Department of Physics and Astronomy at her graduate institution. She was also an Astronomy Instructor for Georgia Perimeter College at the Lawrenceville Campus. After graduate school she was a National Science Foundation Astronomy and Astrophysics Postdoctoral Fellow in the Department of Astronomy at Yale University from 2004 – 2007. She began her time at Lehigh in 2007 as an Assistant Professor for the Department of Physics and in 2013 was promoted to Associate Professor. From 2015-2017 she was the Class of 1961 Professor, this professorship provides financial support through an endowment fund set up by the class. The award recognizes the teaching and scholarly activities of a newly promoted associate professor at the university. McSwain was Lehigh's Research Experiences for Undergraduates (REU) program coordinator for multiple years as well. She plans to continue working on

developing software that is interactive and educational for more current astronomy lab material. She has also recently helped develop two graduate level astronomy courses. She has taught many astronomy courses such as ASTR 301: Modern Astrophysics I, ASTR 7/8: Introductory Astronomy Lecture and Lab, and many ASTR 350 Special Topics.

Joshua A. Pepper was born on September 29, 1977 in Cleveland, Ohio. He earned in A.B. from Princeton University in 2000 and although accepted into graduate school right away took a year to work in New York City as a consultant for Answerthink, Inc., a business technology consulting service. He then went onto The Ohio State University to earn his M.S. and Ph.D. in 2003 and 2007, respectively. Before coming to Lehigh he was a VIDA postdoctoral fellow at Vanderbilt University in their Department of Physics and Astronomy from 2007 to 2013. There he taught two courses, AST 307: Star Formation, Planet Formation, and Exoplanet Detection and AST 322: Methods in Observational and Computational Astronomy. There he also began his work on the Kilodegree Extremely Little Telescope (KELT). In his last year at Vanderbilt he also was a Mentoring Postdoctoral Researcher for the Fisk/Vanderbilt Bridge Program. Pepper entered Lehigh in 2013 and was Assistant Professor until 2018 when promoted to Associate Professor. Thus far he has been a strong asset to the department and was had a vast teaching resume in astronomy and physics. He has taught PHY 372: Introduction to Astrobiology, PHY 350: Special Topics in Astrophysics, PHY 215: Classical Mechanics, ASTRO 302: Modern Astrophysics II, ASTR 105: Introduction to Planetary Astronomy, ASTR 090: Life From Stardust: The Origin of the Earth and the Biosphere, and ASTR 372/472: Exoplanets.

The KELT project developed out of research he began in 2002, working with Andy Gould at Ohio State. That work turned into the paper that describes the optimal telescope configuration for an all-sky transit survey. In short, they found that a small-aperture, wide-field telescope would be the best instrument to detect planetary transits of bright stars. Based on the calculations from the paper, they decided to build such an instrument. That became the KELT-North telescope, which is based Winer Observtory in southwestern Arizona. They published the basic configuration and operation of the telescope in the KELT-north instrumentation paper, and described the results from the KELT-North commissioning survey in a paper describing the variable stars and transit candidates found in that effort. After taking a postdoctoral position at Vanderbilt University, he began building the KELT-South Telescope - a twin of KELT-North. KELT-South is located at Sutherland, South Africa, and is described in the paper "The KELT South Telescope". The two KELT telescopes are separately operated: KELT-North is run by Ohio State, with participation by Vanderbilt and Lehigh. KELT-South is run by Vanderbilt, with participation by Lehigh, Fisk University, and the South African Astronomical Observatory (SAAO). Both telescopes are quite similar in construction, and operate coordinated transit surveys. KELT has now discovered 21 transiting companions to bright stars.

List of Astronomy Instructors

Alfred Doolitte, B.A. Lehigh 1887, Instructor in Mathematics and Astronomy 1890-1892. Died 1920.

Charles Leander Doolittle, C.E. Univ. of Michigan 1874, Sc.D. Univ. of Michigan 1897, LL.D. (Hon.) Lehigh 1912. Professor of Math and Astro, Head of Dept 1874-1895. Died 1919. Published "A Treatise on Practical Astronomy, as applied to Geodesy and Navigation" Wiley and Sons 1885

Eric Doolittle, C.E. Lehigh 1891, Instructor of Mathematics and Astronomy 1892-1893. Died 1920.

Tomlinson Fort, A.B. Univ. of GA 1908, A.M. Univ. of GA 1909, A.M. Harvard 1910, Ph.D. Harvard 1912, Professor and Head of Dept Math and Astro 1927-***

Hiero Benjamin Herr, U.S.N.A. 1866, Professor of Math, Physics, and Engineering 1869-1871, Professor of Mathematics and Astronomy 1871-1874. Head of Dept. Died 1920.

Sidney J. Lockner, A.B. Union College 1890, A.M. Union College 1893, Instructor in Mathematics and Astronomy 1906-1911 Died 1925.

Alfred Marshall Mayer, Ph.D. Pennsylvania College of Gettysburg 1865, Professor of Physics and Astronomy 1866-1871 Died 1897.

Joseph Warren Miller, B.S. PA State College 1897, M.A. Columbia 1899, PhD. Columbia 1901, Instructor in Mathematics and Astronomy 1902-1908, Assistant Professor 1908-1914. Died 1928.

John Hutcheson Ogburn, C.E. Vanderbilt Univ 1892, Instructor in Mathematics and Astronomy 1895-1906, Assistant Professor 1906-1910, Associate Professor 1910-1912, Professor 1912-1939, Professor Emeritus 1939-*** At one tie Lehigh's Oldest Professor

Joseph Benson Reynolds, B.A. Lehigh 1907, M.A. Lehigh 1910, Ph.D. Moravian College 1919, Instructor in Mathematics and Astronomy 1907-1913, Assistant Professor 191301921, Associate Professor 192101927, Professor of Mathematics and Th. Mech 1927-***

John Eugene Stocker, B.S. Lehigh 1895, M.S. Lehigh 1908, Instructor in Mathematics 1903 – 1908, Assistant Professor of Mathematics and Astronomy 1908-1921, Associate Professor 1921-1934, Died 1934

Charles Lewis Thornburg, B.S. (Vanderbilt Univ. 1881, B.E. Vanderbilt Univ. 1882, C.E. Vanderbilt Univ. 1883, Ph.D. Vanderbilt Univ. 1884, LL.D., Hon. Lehigh 1925, Professor of Mathematics and Astronomy, Head of Department 1895-1925, Professor Emeritus 1925-***

Richard Hawley Tucker, C.E. Lehigh 1879, Sc.D. Hon. Lehigh 1922, Instructor in Mathematics and Astronomy 1883-1884.

Ralph Newcomb Van Arnam, E.E. Cornell 1926, M.S. Cornell 1927, Assistant in Mathematics and Astronomy 1928-1930, Associate Professor of Mathematics and Astronomy 1930-1980

William "Nick" Knisley Jr, Bishop, Adjunct Professor 2001 - 2006

John Loomis, retired Kutztown Astronomy Professor, Adjunct Professor 2007 - 2017

George E. McCluskey Jr, PhD U. Pennsylvania 1965, Assistant Professor of Astronomy 1965 – 1968, Associate Professor of Astronomy 1968 – 1976, Professor of Astronomy 1976 – 2002, Professor of Astrophysics 2002 – 2015

Gary G. DeLeo, PhD U. Connecticut 1979, Research Associate 1979 – 1982, Assistant Professor 1982 – 1985, Associate Professor 1985 – 1990, Professor 1990 - present

M. Virginia McSwain, PhD Georgia State University 2004, Assistant Professor of Physics 2007 – 2013, Associate Professor 2013 – present

Joshua A. Pepper, PhD Ohio State 2007, Assistant Professor of Physics 2013 – 2018, Associate Professor 2018 - present

List of Past Students Under B.S. Astrophysics, B.A. Astronomy Era

Ph.D. and Master's students, while may have had astronomy related thesis, receive a degree in physics.

Undergraduates:

2019:
B.S. Astrophysics
Mary Geer Dethero
Henrietta Lukcas
Sean Spooner
Emily Mailhot

2018:
B.S. Astrophysics
Lauren Miller
Aleksandr Sajewski
Mathew Todaro

2017:
B.S. Astrophysics
Simon Hwang

2016:
B.S. Astrophysics
Akshay Kartik Damany (+ B.S. Mechanical Engineering – 2 degrees)
Steven Mark Waskie

2015:
B.S. Astrophysics
Yssavo Ilene Camacho
Staci Nicole Klein

2014:
B.S. Astrophysics
Mark Claus
Kathryn Lester
Sean Napier
Jesse Rowles

2012:
B.S. Astrophysics
Kevin Cooke
Courtney Valenzano

2011:
B.S. Astrophysics
Eric Robert Coughlin
Carl Joseph Mitchell

2010:
B.A. Astronomy
Thomas Robert Craft
B.S. Astrophysics
Tracy Michelle Becker
Kyle Alexander Slattery
Kyle Ward

2009:
B.S. Astrophysics
Alan Chichester Abeel III
Ernest C. Amouzou
Scott Christopher Freese
Alexander Rudolph Nickles

2008:
B.S. Astrophysics
Matthew Quinn Buckner

2007:
B.S. Astrophysics
Robert Jermaine Daye

2006:
B.S. Astrophysics
Daniel Norman Schankel

2005:
B.A. Astronomy
Nina Marie Fink
B.S. Astrophysics
Robert Andrew Mitchell (+ B.A. Philosophy degree – 2 degrees)
Yelena Pelimskaya

2004:
B.S. Astrophysics
Debarati Chattopadhyay

2003:
B.S. Astrophysics
John Joseph Robinson II

Bryan Anton Stear

2002:
B.A. Astronomy
Jason Ryan Leroux (+ B.A. Mathematics major) – 2 majors)

Graduates:

2018:
Ph.D. Physics
Jon Bartz – Dissertation – "Variability of the Be Star Population"
Advisor – J. A. Pepper

2013:
Ph.D. Physics
Amber (Marsh) Boyer – Dissertation – "Analysis of the B and Be Star Populations of the Double Cluster h and χ Persei"
Advisor - M.V. McSwain

2011:
Ph.D. Physics
Christina Aragona – Dissertation – "Multiwavelength Studies of γ-ray Binaries"
Advisor - M. V. McSwain

Peter Tupa – Dissertation – "Ultravoilet Spectroscopic Analysi of the Binary Star System U Cephei"
Advisor - G.G. DeLeo

2008:
Ph.D. Physics
Michael Paul Orleski – Dissertation – "An Ultraviolet Study of the Semi-Detached Eclipsing Binary Star System TT Hydrae"
Advisor – G.E. McCluskey

Philip Anthony Reed - Dissertation – "Ultraviolet Spectroscopy of R Arae: An Active Interacting Binary Star"
Advisor – G.E. McCluskey

2007:
Ph.D. Physics
Kristen Daneille Wecht – Dissertation – "Determination of Mass Loss and Mass Transfer Rates of Algol (Beta Persei) from the Analysis of Absorption Lines in the UV Spectra Obtained by the IUE Satellite"
Advisor G. McCluskey

List of Courses Offered and Faculty as listed in Registers and Catalogs

1860's

1866-1867 Register – Special Collections
Instructors: Alfred Marshall Mayer, Ph.D. Professor of Physics and Astronomy.
Courses: In the school of Civil Engineering for Juniors: Astronomy and Cosmography – Learn the use of astronomical instruments in making observations, in determining latitude and longitude, geodetic surveying, and the establishment of geographic frontiers. Analytical and celestial mechanics.

1867-1868 Register – Special Collections
Instructors: Alfred Marshall Mayer, Ph.D. Professor of Physics and Astronomy.
Courses: In the schools of Civil, Mechanical Engineering, Mining and Metallurgy, and Analytical Chemistry for all Seniors – Astronomy – Loomis' Treatise on Descriptive and Practical Astronomy. Instruction in the use of the sextant, portable meridian circle, and zenith Sector.

1868-1869 Register – Special Collections
Instructors: Alfred Marshall Mayer, Ph.D. Professor of Physics and Astronomy.
Courses: In the school of General Literature, Civil Engineering, and Analytical Chemistry for Seniors: Physics and Astronomy – Loomis' Treatises on Descriptive and Practical Astronomy.
In the school of Civil Engineering for Seniors: Physics and Astronomy – Loomis' Treatises on Descriptive and Practical Astronomy. Learn the use of the sextant, portable meridian circle and zenith Sector. Attendance in the Observatory with the Professor.

1869-1870 Register – Special Collections
Instructors: Alfred Marshall Mayer, Ph.D. Professor of Physics and Astronomy.
Courses: In the school of General Literature, Mechanical Engineering, Mining and Metallurgy, and Analytical Chemistry for Seniors: Physics and Astronomy – Loomis' Treatises on Descriptive and Practical Astronomy. Attendance in Observatory.
In the school of Civil Engineering for Seniors: Physics and Astronomy – Loomis' Treatises on Descriptive and Practical Astronomy. Learn the use of the sextant, portable meridian circle and zenith sector. Attendance in the Observatory with the Professor.

1870's

1870-1871 Register – Special Collections
Instructors: Alfred Marshall Mayer, Ph.D. Professor of Physics and Astronomy.
Courses: In the school of General Literature, Mechanical Engineering, Mining and Metallurgy, and Analytical Chemistry for Seniors: Physics and Astronomy – Loomis' Treatises on Descriptive and Practical Astronomy. Attendance in Observatory.

In the school of Civil Engineering for Seniors: Physics and Astronomy – Loomis' Treatises on Descriptive and Practical Astronomy. Learn the use of the sextant, portable meridian circle and zenith Sector. Attendance in the Observatory with the Professor.

1871-1872 Register – Special Collections
No Instructors listed.
Courses: In the school of General Literature, Mechanical Engineering, Mining and Metallurgy, and Analytical Chemistry for Seniors: Astronomy – Loomis' Treatises on Descriptive Astronomy.
In the school of Civil Engineering for Seniors: Astronomy – Loomis' Treatises on Descriptive and Practical Astronomy.

1872-1873 Register – Special Collections
Instructors: Hiero B. Herr Esq., Professor of Mathematics and Astronomy *First indication of Mathematics and Astronomy organization.
Courses: In the school of General Literature, Mechanical Engineering, Mining and Metallurgy, and Analytical Chemistry for Seniors: Astronomy – Loomis' Treatises on Descriptive Astronomy. Attendance in Observatory.
In the school of Civil Engineering for Seniors: First Term - Loomis' Treatises on Descriptive Astronomy, Second Term – Practical Astronomy.

1873-1874 Register – Special Collections *numbers after titles are equivalent to today's credit hours
No Instructors listed.
Courses: In the school of General Literature and Chemistry for Seniors: First Term – Norton's Descriptive Astronomy (3) .
In the school of Civil Engineering for Seniors: First Term - Norton's Descriptive Astronomy (3), Second Term – Practical Astronomy (2), as applied to Geodetic Surveys.
In the school of Mechanical Engineering for Seniors: First Term – Descriptive Astronomy; attendance in the Observatory.
In the school of Mining and Metallurgy for fifth year students: First Term - Descriptive Astronomy (3).

1874-1875 Register – Special Collections
Instructors: Professor of Mathematics and Astronomy is listed but without named professor.
Courses: In the school of General Literature and Chemistry for Seniors: First Term – Norton's Descriptive Astronomy (3).
In the school of Civil Engineering for Seniors: First Term - Norton's Descriptive Astronomy (3), Second Term – Practical Astronomy (2), as applied to Geodetic Surveys.
In the school of Mechanical Engineering for Seniors: First Term – Descriptive Astronomy (3); attendance in the Observatory.
In the school of Mining and Metallurgy for fifth year students: First Term Descriptive Astronomy (3).

It is noted in this Register in the "Order of the Annual Examination" 1874 that Prof. Heer would be giving the Practical Astronomy exam on Thursday June 18th, 8 ½ to 10 ½ , but what 8 ½ to 10 ½ means, we hope it is not hours!

1875-1876 Register – Special Collections
Instructors: C.L. Doolittle, C.E., Professor of Mathematics and Astronomy.
Courses: In the school of General Literature and Chemistry for Seniors: First Term - Loomis' Descriptive Astronomy (3).
In the school of Civil Engineering for Seniors: First Term – Loomis' Descriptive Astronomy (3), Second Term – Practical Astronomy (2), as applied to Geodetic Surveys.
In the school of Mechanical Engineering for Seniors: First Term – Descriptive Astronomy (3); attendance in the Observatory.
In the school of Mining and Metallurgy for fifth year students: First Term - Descriptive Astronomy (3).
In this register there are note on the Department of Mathematics and Astronomy of additions/donations from U.S. Naval Observatory in the form of Publications, 13 quarto volumes and several pamphlets, from the Observatory of Harvard College also Publications, 5 volumes, and from the Superintendent of Nautical Almanac – 21 unspecified volumes.
There are also notes about the use of Western Union Telegraph Company – Use of wire six nights in determining longitude of Observatory.
C.L. Doolittle made a financial report of "Repairing of Zenith Telescope, &c., $85".

1876-1877 Register – Special Collections
Instructors: C.L. Doolittle, C.E., Professor of Mathematics and Astronomy.
In the school of General Literature for Seniors: First Term - Loomis' Treatise on Astronomy, with Lectures (3).
In the school of Civil Engineering for Seniors: First Term – Loomis' Descriptive Astronomy (3), Second Term – Practical Astronomy (2), as applied to Geodesy and Navigation.
In the school of Mechanical Engineering for Seniors: First Term – Descriptive Astronomy; Observatory practice (3).
In the school of Mining and Metallurgy for fifth year students: First Term - Descriptive Astronomy (3).
In the school of Chemistry for Juniors: First Term - Descriptive Astronomy (3).

1877-1878 Register – Special Collections
Instructors: C.L. Doolittle, C.E., Professor of Mathematics and Astronomy.
In the school of General Literature, Mechanical Engineering, and Chemistry for Seniors: First Term - Descriptive Astronomy - Loomis' Treatise, with Lectures (3).
In the school of Civil Engineering and Mining and Metallurgy for Seniors: First Term – Loomis' Descriptive Astronomy (3), Second Term – Practical Astronomy (2), as applied to Geodesy and Navigation. Included lectures and Observatory work, determination of latitude, longitude and azimuth, practice with the sextant, transit, and zenith telescope (2).
In a post-graduate course for Mechanical Engineering for the degree of Civil Engineer: Second Term - Practical Astronomy, as applied to Geodesy and Navigation. Included

lectures and Observatory work, determination of latitude, longitude and azimuth, practice with the sextant, transit, and zenith telescope (2).
An advanced course in Astronomy and Higher Analysis is established in this year, requiring two years for completion. First Year – Spherical Astronomy, Theory of Instruments, Method of Least Squares, Numerical Calculus. Second year – Celestial Mechanics, Interpolation and Quadrature. Computation of Orbits and Perturbations. During the entire course the student will have ample opportunity to familiarize himself with the practical work of the Observatory and Computing Room.
Publications were added to the Department of Mathematics and Astronomy from the U.S. Naval Observatory, the Cincinnati Observatory, the Observatory of Harvard College, the U.S. Coast Survey, the Smithsonian Institution, and from the American Ephemeris and Nautical Almanac Offices.

1878-1879 Register – Special Collections
Instructors: C.L. Doolittle, C.E., Professor of Mathematics and Astronomy.
In the school of General Literature, Mechanical Engineering, and Chemistry for Seniors: First Term - Descriptive Astronomy - Loomis' Treatise, with lectures (3).
In the school of Civil Engineering and Mining and Metallurgy for Seniors: First Term – Loomis' Descriptive Astronomy (3), Second Term – Practical Astronomy (2), as applied to Geodesy and Navigation. Included lectures and Observatory work, determination of latitude, longitude and azimuth, practice with the sextant, transit, and zenith telescope (2).
In a post-graduate course for Mechanical Engineering for the degree of Civil Engineer Second Term - Practical Astronomy, as applied to Geodesy and Navigation. Included lectures and Observatory work, determination of latitude, longitude and azimuth, practice with the sextant, transit, and zenith telescope (2).
An advanced course in Astronomy and Higher Analysis requires two years for completion. First Year – Spherical Astronomy, Theory of Instruments, Method of Least Squares, Numerical Calculus. Second year – Celestial Mechanics, Interpolation and Quadrature. Computation of Orbits and Perturbations. During the entire course the student will have ample opportunity to familiarize himself with the practical work of the Observatory and Computing Room.

1879-1880 Register – Special Collections
Instructors: C.L. Doolittle, C.E., Professor of Mathematics and Astronomy.
In the school of General Literature, Mechanical Engineering, and Chemistry for Seniors: First Term - Descriptive Astronomy - Loomis' Treatise, with lectures (3).
In the school of Civil Engineering and Mining and Metallurgy for Seniors: First Term – Loomis' Descriptive Astronomy (3), Second Term – Practical Astronomy (2), as applied to Geodesy and Navigation. Included lectures and Observatory work, determination of latitude, longitude and azimuth, practice with the sextant, transit, and zenith telescope (2).
In a post-graduate course for Mechanical Engineering for the degree of Civil Engineer Second Term - Practical Astronomy, as applied to Geodesy and Navigation. Included lectures and Observatory work, determination of latitude, longitude and azimuth, practice with the sextant, transit, and zenith telescope (2).
An advanced course in Astronomy and Higher Analysis requires two years for completion. First Year – Spherical Astronomy, Theory of Instruments, Method of Least

Squares, Numerical Calculus. Second year – Celestial Mechanics, Interpolation and Quadrature. Computation of Orbits and Perturbations. During the entire course the student will have ample opportunity to familiarize himself with the practical work of the Observatory and Computing Room.

1880's

1880-1881 Register – Special Collections
Instructors: C.L. Doolittle, C.E., Professor of Mathematics and Astronomy.
In the school of General Literature, Mechanical Engineering, and Chemistry for Seniors: First Term - Descriptive Astronomy - Loomis' Treatise, with lectures (3).
In the school of Civil Engineering and Mining and Metallurgy for Seniors: First Term – Loomis' Descriptive Astronomy (3), in the second term – Practical Astronomy (2), as applied to Geodesy and Navigation. Included lectures and Observatory work, determination of latitude, longitude and azimuth, practice with the sextant, transit, and zenith telescope (2).
In a post-graduate course for Mechanical Engineering for the degree of Civil Engineer Second Term - Practical Astronomy, as applied to Geodesy and Navigation. Included lectures and Observatory work, determination of latitude, longitude and azimuth, practice with the sextant, transit, and zenith telescope (2).
An advanced course in Astronomy and Higher Analysis requires two years for completion. First Year – Spherical Astronomy, Theory of Instruments, Method of Least Squares, Numerical Calculus. Second year – Celestial Mechanics, Interpolation and Quadrature. Computation of Orbits and Perturbations. During the entire course the student will have ample opportunity to familiarize himself with the practical work of the Observatory and Computing Room.

1881-1882 Register – Special Collections
Instructors: C.L. Doolittle, C.E., Professor of Mathematics and Astronomy.
In the school of General Literature, Mechanical Engineering, and Chemistry for Seniors: First Term - Descriptive Astronomy - Loomis' Treatise, with lectures (3).
In the school of Civil Engineering and Mining and Metallurgy for Seniors: First Term – Loomis' Descriptive Astronomy (3), Second Term – Practical Astronomy (2), as applied to Geodesy and Navigation. Included lectures and Observatory work, determination of latitude, longitude and azimuth, practice with the sextant, transit, and zenith telescope (2).
In a post-graduate course for Mechanical Engineering for the degree of Civil Engineer Second Term - Practical Astronomy, as applied to Geodesy and Navigation. Included lectures and Observatory work, determination of latitude, longitude and azimuth, practice with the sextant, transit, and zenith telescope (2).
An advanced course in Astronomy and Higher Analysis requires two years for completion. First Year – Spherical Astronomy, Theory of Instruments, Method of Least Squares, Numerical Calculus. Second year – Celestial Mechanics, Interpolation and Quadrature. Computation of Orbits and Perturbations. During the entire course the student will have ample opportunity to familiarize himself with the practical work of the Observatory and Computing Room.

**Schools and courses used interchangeably in the early years of the University, what is most important is the astronomy as related to the given "majors" in our modern sense.*

1882-1883 Register – Special Collections
Instructors: C.L. Doolittle, C.E., Professor of Mathematics and Astronomy.
Courses: In the school of General Literature, Mechanical Engineering for Seniors: First Term – Newcomb's Treatise with lectures (3).
In the school of Civil Engineering for Seniors: First Term - Descriptive Astronomy (3), Second Term - Practical Astronomy as applied to Geodesy and Navigation. Included lectures and Observatory work, determination of latitude, longitude and azimuth, practice with the sextant, transit, and zenith telescope (2).
In the school of Mining and Metallurgy for fifth year students: First Term - Newcomb Descriptive Astronomy (3), Second Term - Practical work (2).
An advanced course in Astronomy and Higher Analysis requires two years for completion. First Year – Spherical Astronomy, Theory of Instruments, Method of Least Squares, Numerical Calculus. Second year – Celestial Mechanics, Interpolation and Quadrature. Computation of Orbits and Perturbations. During the entire course the student will have ample opportunity to familiarize himself with the practical work of the Observatory and Computing Room.

1883-1884 Register – Special Collections
Instructors: C.L. Doolittle, C.E., Professor of Mathematics and Astronomy.
Courses: In the school of General Literature, Mechanical Engineering, and Chemistry Seniors: First Term - Loomis' Treatise with lectures (3).
In the school of Civil Engineering for Seniors: First Term - Descriptive Astronomy (3), Second Term - Practical Astronomy as applied to Geodesy and Navigation. Included lectures and Observatory work, determination of latitude, longitude and azimuth, practice with the sextant, transit, and zenith telescope (2).
In the school of Mining and Metallurgy for fifth year students: First Term - Loomis' Descriptive Astronomy (3), Second term Practical work (2).
These registers listed the known current positions of alumni (in this documents, positions pertaining to astronomy will be listed):
R.H. Tucker, C.E. of the Class of 1879 is listed as an Instructor in Mathematics and Astronomy at Lehigh University.
An advanced course in Astronomy and Higher Analysis requires two years for completion. First Year – Spherical Astronomy, Theory of Instruments, Method of Least Squares, Numerical Calculus. Second year – Celestial Mechanics, Interpolation and Quadrature. Computation of Orbits and Perturbations. During the entire course the student will have ample opportunity to familiarize himself with the practical work of the Observatory and Computing Room.

1884-1885 Register – Special Collections
Instructors: C.L. Doolittle, C.E., Professor of Mathematics and Astronomy.
Courses: In the school of General Literature, Mechanical Engineering, and Chemistry Seniors: First Term - Loomis' Treatise with lectures (3).

In the school of Civil Engineering for Seniors: First Term - Descriptive Astronomy (3), Second Term - Practical Astronomy, as applied to Geodesy and Navigation. Included lectures and Observatory work, determination of latitude, longitude and azimuth, practice with the sextant, transit, and zenith telescope (2).
In the school of Mining and Metallurgy for fifth year students: First Term - Loomis' Descriptive Astronomy (3), Second Term - Practical work (2).
An advanced course in Astronomy and Higher Analysis requires two years for completion. First Year – Spherical Astronomy, Theory of Instruments, Method of Least Squares, Numerical Calculus. Second year – Celestial Mechanics, Interpolation and Quadrature. Computation of Orbits and Perturbations. During the entire course the student will have ample opportunity to familiarize himself with the practical work of the Observatory and Computing Room.

1885-1886 Register – Special Collections
Instructors: C.L. Doolittle, C.E., Professor of Mathematics and Astronomy.
Courses: In the school of General Literature, Mechanical Engineering, and Chemistry Seniors: First Term - Loomis' Treatise with lectures (3).
In the advanced Mechanical Engineering course: Second Term – Doolittle's Practical Astronomy with observatory work (2).
In the school of Civil Engineering for Seniors: First Term - Descriptive Astronomy Loomis, with lectures (3), Second Term – Doolittle's Practical Astronomy with observatory work (2).
In the school of Mining and Metallurgy for fifth year students: First Term - Loomis' Descriptive Astronomy, Second Term - Doolittle's Practical Astronomy with observatory work (2).
An advanced course in Astronomy and Higher Analysis requires two years for completion. First Year – Spherical Astronomy, Theory of Instruments, Method of Least Squares, Numerical Calculus. Second year – Celestial Mechanics, Interpolation and Quadrature. Computation of Orbits and Perturbations. During the entire course the student will have ample opportunity to familiarize himself with the practical work of the Observatory and Computing Room.

1886-1887 Register – Special Collections
Instructors: C.L. Doolittle, C.E., Professor of Mathematics and Astronomy.
Courses: In the school of General Literature, Mechanical Engineering, and Chemistry Seniors: First term - Loomis' Treatise with Lectures (3).
In the advanced Mechanical Engineering course: First Term – Doolittle's Practical Astronomy with observatory work (2).
In the school of Civil Engineering for Seniors: First Term - Descriptive Astronomy Loomis, with lectures (3), Second Term – Doolittle's Practical Astronomy with observatory work (2).
In the school of Mining and Metallurgy for fifth year students: First Term - Loomis' Descriptive Astronomy (3), Second Term - Doolittle's Practical Astronomy with observatory work (2).
An advanced course in Astronomy and Higher Analysis requires two years for completion. First Year – Spherical Astronomy, Theory of Instruments, Method of Least

Squares, Numerical Calculus. Second year – Celestial Mechanics, Interpolation and Quadrature. Computation of Orbits and Perturbations. During the entire course the student will have ample opportunity to familiarize himself with the practical work of the Observatory and Computing Room.
Mention of Ferguson's Astronomy and Herchel's Treatise on Astronomy addition to Department.

1887-1888 Register – Special Collections
Instructors: C.L. Doolittle, C.E., Professor of Mathematics and Astronomy.
Courses: In the school of General Literature, Mechanical Engineering, and Chemistry Seniors: First Term - Loomis' Treatise with Lectures (3).
In the advanced Mechanical Engineering course: Second Term – Doolittle's Practical Astronomy with observatory work (2).
In the school of Civil Engineering for Seniors: First Term - Descriptive Astronomy Loomis, with lectures (3), Second Term– Doolittle's Practical Astronomy with observatory work (2).
In the school of Mining and Metallurgy for post-senior students: First Term - Loomis' Descriptive Astronomy (3), Second Term - Doolittle's Practical Astronomy with observatory work (2).
An advanced course in Astronomy and Higher Analysis requires two years for completion. First Year – Spherical Astronomy, Theory of Instruments, Method of Least Squares, Numerical Calculus. Second year – Celestial Mechanics, Interpolation and Quadrature. Computation of Orbits and Perturbations. During the entire course the student will have ample opportunity to familiarize himself with the practical work of the Observatory and Computing Room.
Mention of Naval Brigade and Operations, Astronomy. H.K. Gilman, addition to Department.

1888-1889 Register – Special Collections
Instructors: C.L. Doolittle, C.E., Professor of Mathematics and Astronomy.
Courses: In the school of General Literature, Mechanical Engineering, and Chemistry Seniors: First Term - Loomis' Treatise with lectures (3).
In the advanced Mechanical Engineering course: Second Term – Doolittle's Practical Astronomy with observatory work (2).
In the school of Civil Engineering for Seniors: First Term - Descriptive Astronomy Loomis, with lectures (3), Second Term – Doolittle's Practical Astronomy with observatory work (2).
In the school of Mining and Metallurgy for post-senior students: First Term - Loomis' Descriptive Astronomy, Second Term - Doolittle's Practical Astronomy with observatory work (2).
An advanced course in Astronomy and Higher Analysis requires two years for completion. First Year – Spherical Astronomy, Theory of Instruments, Method of Least Squares, Numerical Calculus. Second year – Celestial Mechanics, Interpolation and Quadrature. Computation of Orbits and Perturbations. During the entire course the student will have ample opportunity to familiarize himself with the practical work of the Observatory and Computing Room.

1889-1890 Register – Special Collections
Instructors: C.L. Doolittle, C.E., Professor of Mathematics and Astronomy.
In a brief description of topics: Astronomy – This study is taken up during the first term of the Senior Year. Young's General Astronomy being used as the textbook. There are three exercises a week, and visits to the Observatory help to make the work interesting as well as profitable.
Courses: In the school of General Literature, Mechanical Engineering, and Chemistry Seniors: First Term - Loomis' Treatise with lectures (3).
In the advanced Mechanical Engineering course: Second Term – Doolittle's Practical Astronomy with observatory work (2).
In the school of Civil Engineering for Seniors: First Term - Descriptive Astronomy Loomis, with lectures (3), Second Term – Doolittle's Practical Astronomy with observatory work (2).
In the school of Mining and Metallurgy for post-graduate students: First Term - Loomis' Descriptive Astronomy (3), Second Term - Doolittle's Practical Astronomy with observatory work (2).
An advanced course in Astronomy and Higher Analysis requires two years for completion. First Year – Spherical Astronomy, Theory of Instruments, Method of Least Squares, Numerical Calculus. Second year – Celestial Mechanics, Interpolation and Quadrature. Computation of Orbits and Perturbations. During the entire course the student will have ample opportunity to familiarize himself with the practical work of the Observatory and Computing Room.

1890's

1890-1891 Register – Special Collections
Instructors: C.L. Doolittle, C.E., Professor of Mathematics and Astronomy, Alfred Doolittle, B.A., Instructor in Mathematics and Astronomy.
In a brief description of topics: Astronomy – This study is taken up during the first term of the Senior Year. Young's General Astronomy being used as the textbook. There are three exercises a week, and visits to the Observatory help to make the work interesting as well as profitable.
Courses: In the school of General Literature, Mechanical Engineering, and Chemistry Seniors: First Term - Young's General Astronomy (3).
In the advanced Mechanical Engineering course: Second Term – Doolittle's Practical Astronomy with observatory work (2). I
n the school of Civil Engineering for Seniors: First Term - Young's General Astronomy (3), Second Term– Doolittle's Practical Astronomy with observatory work (2).
In the school of Mining and Metallurgy for post-graduate students: First Term - Young's General Astronomy, Second Term - Doolittle's Practical Astronomy with observatory work (2).
An advanced course in Astronomy and Higher Analysis requires two years for completion. First Year – Spherical Astronomy, Theory of Instruments, Method of Least Squares, Numerical Calculus. Second year – Celestial Mechanics, Interpolation and Quadrature. Computation of Orbits and Perturbations. During the entire course the

student will have ample opportunity to familiarize himself with the practical work of the Observatory and Computing Room.

1891-1892 Register – Special Collections
Instructors: C.L. Doolittle, C.E., Professor of Mathematics and Astronomy, Alfred Doolittle, B.A., Instructor in Mathematics and Astronomy.
In a brief description of topics: Astronomy – This study is taken up during the first term of the Senior Year. Young's General Astronomy being used as the textbook. There are three exercises a week, and visits to the Observatory help to make the work interesting as well as profitable.
Courses: Astronomy – In the school of General Literature, Mechanical Engineering, and Chemistry Seniors: First Term - Young's General Astronomy (3).
In the advanced Mechanical Engineering course: Second Term – Doolittle's Practical Astronomy with observatory work (2).
In the school of Civil Engineering for Seniors: First Term - Young's General Astronomy (3), Second Term – Doolittle's Practical Astronomy with observatory work (2).
In the school of Mining and Metallurgy for post-graduate students: First Term: Young's General Astronomy, Second Term - Doolittle's Practical Astronomy with observatory work (2).

1892-1893 Register – Special Collections
Instructors: C.L. Doolittle, C.E., Professor of Mathematics and Astronomy, Eric Doolittle, C.E., Instructor in Mathematics and Astronomy.
In a brief description of topics: Astronomy – This study is taken up during the first term of the Senior Year. Young's General Astronomy being used as the textbook. There are three exercises a week, and visits to the Observatory help to make the work interesting as well as profitable.
Courses: Astronomy – In the school of General Literature, Mechanical Engineering, and Chemistry Seniors: First Term - Young's General Astronomy (3). In the advanced Mechanical Engineering course: Second Term – Doolittle's Practical Astronomy with observatory work (2).
In the school of Civil Engineering for Seniors: First Term - Young's General Astronomy (3), Second Term – Doolittle's Practical Astronomy with observatory work (2).
In the school of Mining and Metallurgy for post-graduate students: First Term - Young's General Astronomy, Second Term - Doolittle's Practical Astronomy with observatory work (2).
Known Alumni positions related to astronomy listed in register:
Richard H. Tucker, Jr., C.E. is listed as an Assistant Astronomer at the Naval Observatory, Cordova, Argentine Republic, S.A. (LU class of 1879)

1893-1894 Register – Special Collections
Instructors: C.L. Doolittle, C.E., Professor of Mathematics and Astronomy.
In a brief description of topics: Astronomy – This study is taken up during the first term of the Senior Year. Young's General Astronomy being used as the textbook. There are three exercises a week, and visits to the Observatory help to make the work interesting as well as profitable.

Courses: Astronomy – In the school of General Literature, Mechanical Engineering, and Chemistry Seniors First Term - Young's General Astronomy (3).
In the advanced Mechanical Engineering course: Second Term – Doolittle's Practical Astronomy with observatory work (2).
In the school of Civil Engineering for Seniors: First Term - Young's General Astronomy (3), Second Term – Doolittle's Practical Astronomy with observatory work (2).
In the school of Mining and Metallurgy for post-graduate students: First Term, Young's General Astronomy, Second Term - Doolittle's Practical Astronomy with observatory work (2).
Known Alumni positions related to astronomy listed in this register:
Miles Rock, C.E. of the class of 1869 is listed as Astronomer, Chief Engineer and President of the Boundary Commission of Guatemala with Mexico, Guatemala, Centro-America.
Lester Clark Taylor, C.E., of the class of 1889 is listed as Assistant to the National Astronomer of the Argentine Republic, Buenos Ayres, Argentine Republic, S.A.

1894-1895 Register – Special Collections
Instructors: C.L. Doolittle, C.E., Professor of Mathematics and Astronomy.
In a brief description of topics: Astronomy – This study is taken up during the first term of the Senior Year. Young's General Astronomy being used as the textbook. There are three exercises a week, and visits to the Observatory help to make the work interesting as well as profitable.
Courses: In the school of General Literature, Mechanical Engineering, and Chemistry Seniors: First Term - Young's General Astronomy (3).
In the advanced Mechanical Engineering course: Second Term – Doolittle's Practical Astronomy with observatory work (2).
In the school of Civil Engineering for Seniors: First Term - Young's General Astronomy (3), Second Term – Doolittle's Practical Astronomy with observatory work (2).
In the school of Mining and Metallurgy for post-graduate students: First Term - Young's General Astronomy (3), Second Term - Doolittle's Practical Astronomy with observatory work (2).
Known Alumni positions listed in this register:
Eric Doolittle, C.E. class of 1891 is listed as Instructor in Mathematics and Astronomy at Iowa State University.
Miles Rock, C.E. of the class of 1869 is listed as Astronomer, Chief Engineer and President of the Boundary Commission of Guatemala with Mexico, Guatemala, Centro-America.
Lester Clark Taylor, C.E., of the class of 1889 is listed as Assistant to the National Astronomer of the Argentine Republic, Buenos Ayres, Argentine Republic, S.A.

1895-1896 Register – Special Collections
Instructors: John Hutcheson Ogburn, C.E. Instructor in Mathematics and Astronomy.
In a brief description of topics: Astronomy – This study is taken up during the first term of the Senior Year. Young's General Astronomy being used as the textbook. There are three exercises a week, and visits to the Observatory help to make the work interesting as well as profitable.

Courses: In the school of General Literature, Mechanical Engineering, and Chemistry Seniors: First Term - Young's General Astronomy (3).
In the advanced Mechanical Engineering course: Second Term – Doolittle's Practical Astronomy with observatory work (2).
In the school of Civil Engineering for Seniors: First Term - Young's General Astronomy (3), Second Term – Doolittle's Practical Astronomy with observatory work (2).
In the school of Mining and Metallurgy for post-graduate students: First Term - Young's General Astronomy, Second Term - Doolittle's Practical Astronomy with observatory work (2).
Known Alumni positions related to astronomy listed in this register:
Eric Doolittle, C.E. class of 1891 is listed as Instructor in Mathematics and Astronomy at Iowa State University.
Henry Brown Evans, M.E. class of 1893 is listed as Instructor in Mathematics and Astronomy, University of Pennsylvania
Miles Rock, C.E. of the class of 1869 is listed as Astronomer, Chief Engineer and President of the Boundary Commission of Guatemala with Mexico, Guatemala, Centro-America.
Lester Clark Taylor, C.E., of the class of 1889 is listed as Assistant to the National Astronomer of the Argentine Republic, Buenos Ayres, Argentine Republic, S.A.

1896-1897 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy, John Hutcheson Ogburn, C.E. Instructor in Mathematics and Astronomy.
In a brief description of topics: Astronomy – This study is taken up during the first term of the Senior Year. Young's General Astronomy being used as the textbook. There are three exercises a week, and visits to the Observatory help to make the work interesting as well as profitable.
Courses: In the school of General Literature, Mechanical Engineering, and Chemistry Seniors: First Term - Young's General Astronomy (3).
In the advanced Mechanical Engineering course: Second Term – Doolittle's Practical Astronomy with observatory work (2).
In the school of Civil Engineering for Seniors: First Term - Young's General Astronomy (3), Second Term – Doolittle's Practical Astronomy with observatory work (2).
In the school of Mining and Metallurgy for post-graduate students: First Term - Young's General Astronomy, Second Term - Doolittle's Practical Astronomy with observatory work (2).
Known Alumni positions related to astronomy listed in this register:
Miles Rock, C.E. of the class of 1869 is listed as Astronomer, Chief Engineer and President of the Boundary Commission of Guatemala with Mexico, Guatemala, Centro-America.
Richard Hawley Tucker, C.E. class of 1879 is listed as Astronomer at Lick Observatory on Mt. Hamilton, CA.
Eric Doolittle, C.E. class of 1891 is listed as Instructor in Astronomy at the Flower Astronomical Observatory, Philadelphia, PA.
Henry Brown Evans, M.E., class of 1893 is listed as Instructor in Mathematics and Astronomy, University of Pennsylvania, Flower Astronomical Observatory.

1897-1898 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy, John Hutcheson Ogburn, C.E. Instructor in Mathematics and Astronomy
In a brief description of topics: Astronomy – This study is taken up during the first term of the Senior Year. Young's General Astronomy being used as the textbook. There are three exercises a week, and visits to the Observatory help to make the work interesting as well as profitable.
Courses: In the school of General Literature, Mechanical Engineering, and Chemistry Seniors: First Term - Young's General Astronomy (3).
In the advanced Mechanical Engineering course: Second Term – Doolittle's Practical Astronomy with observatory work (2).
In the school of Civil Engineering for seniors: First Term - Young's General Astronomy (3), Second Term – Doolittle's Practical Astronomy with observatory work (2).
In the school of Mining and Metallurgy for post-graduate students: First Term - Young's General Astronomy, Second Term - Doolittle's Practical Astronomy with observatory work (2).
Known Alumni positions related to astronomy listed in this register:
Miles Rock, C.E. of the class of 1869 is listed as Astronomer, Chief Engineer and President of the Boundary Commission of Guatemala with Mexico, Guatemala, Centro-America.
Richard Hawley Tucker, C.E. class of 1879 is listed as Astronomer at Lick Observatory on Mt. Hamilton, CA.
Henry Brown Evans, M.E., class of 1893 is listed as Instructor in Mathematics and Astronomy, University of Pennsylvania, Flower Astronomical Observatory.

1898-1899 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy, John Hutcheson Ogburn, C.E. Instructor in Mathematics and Astronomy.
Courses: In the school of General Literature, Mechanical Engineering, and Chemistry Seniors: First Term - Young's General Astronomy (3).
In the advanced Mechanical Engineering course: Second Term – Doolittle's Practical Astronomy with observatory work (2).
In the school of Civil Engineering for seniors: First Term - Young's General Astronomy (3), Second Term – Doolittle's Practical Astronomy with observatory work (2).
In the school of Mining and Metallurgy for post-graduate students: First Term - Young's General Astronomy, Second Term - Doolittle's Practical Astronomy with observatory work (2).
Known Alumni positions related to astronomy listed in this register:
Miles Rock, C.E. of the class of 1869 is listed as Astronomer, Chief Engineer and President of the Boundary Commission of Guatemala with Mexico, Guatemala, Centro-America.
Richard Hawley Tucker, C.E. class of 1879 is listed as Astronomer at Lick Observatory on Mt. Hamilton, CA.
Henry Brown Evans, M.E., class of 1893 is listed as Instructor in Mathematics and Astronomy, University of Pennsylvania, Flower Astronomical Observatory.

1899-1900 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics Astronomy, John Hutcheson Ogburn, C.E. Instructor in Mathematics and Astronomy.
List of studies: Mathematics and Astronomy: 73. Descriptive Astronomy – A study of the fundamentals facts and principles of the subject with solution of problems; observatory visits. (3),
74. Practical Astronomy – Study of instruments used, method of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work is which each student makes his own observations and computations (2).
Courses: The Classical Course – Senior Year First Term – Descriptive Astronomy (3), Second Term – Practical Astronomy (2).
The Latin-Scientific Course – Senior Year First Term – Descriptive Astronomy (3), Second Term – Practical Astronomy (2).
The Civil Engineering Course – Junior Year First Term – Descriptive Astronomy (3), Second Term – Practical Astronomy (2).
The Geology Course – Senior Year First Term – Descriptive Astronomy (3) .
Known Alumni positions related to astronomy listed in this register:
Miles Rock, C.E. of the class of 1869 is listed as Astronomer, Chief Engineer and President of the Boundary Commission of Guatemala with Mexico, Guatemala, Centro-America.
Richard Hawley Tucker, C.E. class of 1879 is listed as Astronomer at Lick Observatory on Mt. Hamilton, CA.
Henry Brown Evans, M.E., class of 1893 is listed as Instructor in Mathematics and Astronomy, University of Pennsylvania, Flower Astronomical Observatory.

1900's

1900-1901 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy, John Hutcheson Ogburn, C.E. Instructor in Mathematics and Astronomy.
List of studies in Mathematics and Astronomy: Practical Astronomy taught by Prof. Thornburg – The work embraces: a) The study of the instruments and method used to determine time, latitude, longitude, and azimuth; b) Practical work in the observatory, securing facility in making and reducing observations. Two terms (4).
Courses: The Classical Course – Senior Year First Term – Descriptive Astronomy (3), Second Term – Practical Astronomy (2).
The Latin-Scientific Course – Senior Year First Term – Descriptive Astronomy (3), Second Term – Practical Astronomy (2).
The Civil Engineering Course – Junior Year First Term – Descriptive Astronomy (3), Second Term – Practical Astronomy (2).
The Geology Course – Senior Year First Term – Descriptive Astronomy (3) .
The Physics Course – Junior or Senior Year First Term – Descriptive Astronomy (3), Second Term – Practical Astronomy (2).
Known Alumni positions related to astronomy listed in this register:

Richard Hawley Tucker, C.E. class of 1879 is listed as Astronomer at Lick Observatory on Mt. Hamilton, CA.
Henry Brown Evans, M.E., class of 1893 is listed as Instructor in Mathematics and Astronomy, University of Pennsylvania, Flower Astronomical Observatory.

1901-1902 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy, John Hutcheson Ogburn, C.E. Instructor in Mathematics and Astronomy.
List of studies in Mathematics and Astronomy: Practical Astronomy taught by Prof. Thornburg – The work embraces: a) The study of the instruments and method used to determine time, latitude, longitude, and azimuth; b) Practical work in the observatory, securing facility in making and reducing observations. Two terms (4).
84. Descriptive Astronomy - A study of the fundamental facts and principles of the subject with solutions of problems; observatory visits (3).
85. Practical Astronomy - Study of instruments used, methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each student makes his own observations and computations in illustration of the problems studied. As this study is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work (2).
The Classical Course – Senior Year First Term – Descriptive Astronomy (3), Second Term – Practical Astronomy (2).
The Latin-Scientific Course – Senior Year First Term – Descriptive Astronomy (3), Second Term – Practical Astronomy (2).
The Civil Engineering Course – Junior Year First Term – Descriptive Astronomy (3), Second Term – Practical Astronomy (2).
The Geology Course – Senior Year First Term – Descriptive Astronomy (3).
The Physics Course – Junior or Senior Year First Term – Descriptive Astronomy (3), Second Term – Practical Astronomy (2).
Known Alumni positions related to astronomy listed in this register:
Richard Hawley Tucker, C.E. class of 1879 is listed as Astronomer at Lick Observatory on Mt. Hamilton, CA.
Eric Doolittle, C.E. class of 1891 is listed as Instructor in Astronomy at the Flower Astronomical Observatory, Philadelphia, PA.

1902-1903 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy, John Hutcheson Ogburn, C.E. Instructor in Mathematics and Astronomy, James Warren Miller, B.S., M.A., Ph.D., Instructor in Mathematics and Astronomy.
List of studies in Mathematics and Astronomy: Practical Astronomy taught by Prof. Thornburg – The work embraces: a) The study of the instruments and method used to determine time, latitude, longitude, and azimuth; b) Practical work in the observatory, securing facility in making and reducing observations. Two terms (4).
84. Descriptive Astronomy - A study of the fundamental facts and principles of the subject with solution of problems; observatory visits (3).
85. Practical Astronomy - Study of instruments used, methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in

which each student makes his own observations and computations in illustration of the problems studied. As this study is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work (2).
The Classical Course – Senior Year First Term – Descriptive Astronomy (3), Second Term – Practical Astronomy (2).
The Latin-Scientific Course – Senior Year First Term – Descriptive Astronomy (3), Second Term – Practical Astronomy (2).
The Civil Engineering Course – Junior Year First Term – Descriptive Astronomy (3), Second Term – Practical Astronomy (2).
The Geology Course – Senior Year First Term – Descriptive Astronomy (3).
The Physics Course – Junior or Senior Year First Term – Descriptive Astronomy (3), Second Term – Practical Astronomy (2).
The Mining Course – Junior First Term – Descriptive Astronomy (3), Second Term – Practical Astronomy (2).
Known Alumni positions related to astronomy listed in this register:
Eric Doolittle, C.E. class of 1891 is listed as Instructor in Astronomy at the Flower Astronomical Observatory, Philadelphia, PA.

1903-1904 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy, John Hutcheson Ogburn, C.E. Instructor in Mathematics and Astronomy, James Warren Miller, B.S., M.A., Ph.D., Instructor in Mathematics and Astronomy.
List of studies in Mathematics and Astronomy: Practical Astronomy taught by Prof. Thornburg – The work embraces: a) The study of the instruments and method used to determine time, latitude, longitude, and azimuth; b) Practical work in the observatory, securing facility in making and reducing observations. Two terms (4).
Courses: 118. Descriptive Astronomy - A study of the fundamental facts and principles of the subject with solution of problems; observatory visits. Second term (3).
119. Practical Astronomy - Study of instruments used, methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each student makes his own observations and computations in illustration of the problems studied. As this study is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First term (3).
The Classical Course – Senior Year First Term – Descriptive Astronomy (3), Second Term – Practical Astronomy (2).
The Latin-Scientific Course – Senior Year First Term – Descriptive Astronomy (3), Second Term – Practical Astronomy (2).
The Civil Engineering Course – Junior Year First Term – Descriptive Astronomy (3), Second Term – Practical Astronomy (2).
The Geology Course – Senior Year First Term – Descriptive Astronomy (3).
The Physics Course – Junior or Senior Year First Term – Descriptive Astronomy (3), Second Term – Practical Astronomy (2).
The Mining Course – Junior First Term – Descriptive Astronomy (3), Second Term – Practical Astronomy (2).
Known Alumni positions related to astronomy listed in this register:

Richard Hawley Tucker, C.E. class of 1879 is listed as Astronomer at Lick Observatory on Mt. Hamilton, CA.
Eric Doolittle, C.E. class of 1891 is listed as Instructor in Astronomy at the Flower Astronomical Observatory, Philadelphia, PA.

1904-1905 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy, John Hutcheson Ogburn, C.E. Instructor in Mathematics and Astronomy, James Warren Miller, B.S., M.A., Ph.D., Instructor in Mathematics and Astronomy.
List of studies in Mathematics and Astronomy: Practical Astronomy taught by Prof. Thornburg – The work embraces: a) The study of the instruments and method used to determine time, latitude, longitude, and azimuth; b) Practical work in the observatory, securing facility in making and reducing observations. Two terms (4).
Courses: 118. Descriptive Astronomy - A study of the fundamental facts and principles of the subject with solution of problems; observatory visits. Second term (3).
119. Practical Astronomy - Study of instruments used, methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each student makes his own observations and computations in illustration of the problems studied. As this study is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First term (3).
The Classical and Latin-Scientific Course – Astronomy in Junior or Senior Second Terms.
Civil Engineering – Astronomy in fifth year second term and sixth year first term.
Known Alumni positions related to astronomy listed in this register:
Richard Hawley Tucker, C.E. class of 1879 is listed as Astronomer at Lick Observatory on Mt. Hamilton, CA.
Eric Doolittle, C.E. class of 1891 is listed as Instructor in Astronomy at the Flower Astronomical Observatory, Philadelphia, PA.
It is around this time we notice astronomy is required for fewer courses than in the earlier period of Lehigh. But, the Sayre Observatory Annex, which housed the modern zenith telescope, was added in 1903.

1905-1906 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy, John Hutcheson Ogburn, C.E. Instructor in Mathematics and Astronomy, James Warren Miller, B.S., M.A., Ph.D., Instructor in Mathematics and Astronomy.
List of studies in Mathematics and Astronomy: Practical Astronomy taught by Prof. Thornburg – The work embraces: a) The study of the instruments and method used in to determine time, latitude, longitude, and azimuth; b) Practical work in the observatory, securing facility in making and reducing observations. Two terms (4).
Courses: 148. Descriptive Astronomy - A study of the fundamental facts and principles of the subject with solution of problems; observatory visits. Second term (3).
149. Practical Astronomy - Study of instruments used, methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each student makes his own observations and computations in illustration of the

problems studied. As this study is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First term (3).
The Classical and Latin-Scientific Course – Astronomy in Junior or Senior Second Terms.
Civil Engineering – Astronomy in fifth year second term and sixth year first term.
Known Alumni positions related to astronomy listed in this register:
Richard Hawley Tucker, C.E. class of 1879 is listed as Astronomer at Lick Observatory on Mt. Hamilton, CA.
Eric Doolittle, C.E. class of 1891 is listed as Instructor in Astronomy at the Flower Astronomical Observatory, Philadelphia, PA.

1906-1907 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy, John Hutcheson Ogburn, C.E., Instructor in Mathematics and Astronomy, James Warren Miller, B.S., M.A., Ph.D., Instructor in Mathematics and Astronomy, Sidney J. Lockner, B.A., Instructor in Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.
List of studies in Mathematics and Astronomy: Practical Astronomy taught by Prof. Thornburg – The work embraces: a) The study of the instruments and method used in to determine time, latitude, longitude, and azimuth; b) Practical work in the observatory, securing facility in making and reducing observations. Two terms (5).
Courses: 149. Descriptive Astronomy - A study of the fundamental facts and principles of the subject with solution of problems; observatory visits. Second term (3).
150. Practical Astronomy - Study of instruments used, methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each student makes his own observations and computations in illustration of the problems studied. As this study is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First term (3).
Summer school in astronomy noted.
The Classical and Latin-Scientific Course – Astronomy in either Junior or Senior Second Terms.
Civil Engineering – Astronomy in fifth year Second Term and sixth year First Term.
Known Alumni positions related to astronomy listed in this register:
Richard Hawley Tucker, C.E. class of 1879 is listed as Astronomer at Lick Observatory on Mt. Hamilton, CA.
Eric Doolittle, C.E. class of 1891 is listed as Instructor in Astronomy at the Flower Astronomical Observatory, Philadelphia, PA.

1907-1908 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy, John Hutcheson Ogburn, C.E. Instructor in Mathematics and Astronomy, James Warren Miller, B.S., M.A., Ph.D., Instructor in Mathematics and Astronomy, Sidney J. Lockner, B.A., Instructor in Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.
List of studies in Mathematics and Astronomy: Practical Astronomy taught by Prof. Thornburg – The work embraces: a) The study of the instruments and method used to

determine time, latitude, longitude, and azimuth; b) Practical work in the observatory, securing facility in making and reducing observations. Two terms (5).
Courses: 149. Descriptive Astronomy - A study of the fundamental facts and principles of the subject with solution of problems; observatory visits. Second term (3).
150. Practical Astronomy - Study of instruments used, methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each student makes his own observations and computations in illustration of the problems studied. As this study is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First term (3).
Summer school in astronomy noted.
The Classical and Latin-Scientific Course – Astronomy in either Junior or Senior Second Terms.
Civil Engineering – Astronomy in fifth year Second Term and sixth year First Term.
Known Alumni positions related to astronomy listed in this register:
Richard Hawley Tucker, C.E. class of 1879 is listed as Astronomer at Lick Observatory on Mt. Hamilton, CA.
Eric Doolittle, C.E. class of 1891 is listed as Instructor in Astronomy at the Flower Astronomical Observatory, Philadelphia, PA.

1908-1909 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy, John Hutcheson Ogburn, C.E. Assistant Professor in Mathematics and Astronomy, John E. Stocker, B.S., M.S., Assistant Professor of Mathematics and Astronomy, Sidney J. Lockner, B.A., Instructor in Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.
List of studies in Mathematics and Astronomy: Practical Astronomy taught by Prof. Thornburg – The work embraces: a) The study of the instruments and method used to determine time, latitude, longitude, and azimuth; b) Practical work in the observatory, securing facility in making and reducing observations. Two terms (5).
Courses: 148. Descriptive Astronomy - A study of the fundamental facts and principles of the subject with solution of problems; observatory visits. Second term (3).
149. Practical Astronomy - Study of instruments used, methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each student makes his own observations and computations in illustration of the problems studied. As this study is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First term (3).
Summer school in astronomy noted.
Practical Astronomy listed as technical senior elective.
Civil Engineering – Astronomy in fifth year Second Term and sixth year First Term.
Known Alumni positions related to astronomy listed in this register:
Richard Hawley Tucker, C.E. class of 1879 is listed as Astronomer in charge, Southern Observatory, Carnegie Institution, Dudley Observatory, Albany, NY.
Eric Doolittle, C.E. class of 1891 is listed as Instructor in Astronomy at the Flower Astronomical Observatory, Philadelphia, PA.

1909-1910 Register – Special Collections – Unable to locate

1910's

1910-1911 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy, John Hutcheson Ogburn, C.E. Assistant Professor in Mathematics and Astronomy, John E. Stocker, B.S., M.S., Assistant Professor of Mathematics and Astronomy, Sidney J. Lockner, B.A., Instructor in Mathematics and Astronomy, Joseph B. Reynolds, B.A., Instructor in Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.
First indication of "Courses in Arts and Sciences", in which astronomy and mathematics are included.
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
For Courses in which Geological Sciences predominate astronomy is listed as a senior elective.
For Courses in which physics and mathematics predominate astronomy is listed as either junior or senior elective.
In the fifth and sixth years of the B.A. and the Civil Engineering Course astronomy is listed in junior and senior years.
List of studies in Mathematics and Astronomy: Practical Astronomy taught by Prof. Thornburg – The work embraces: a) The study of the instruments and method used to determine time, latitude, longitude, and azimuth; b) Practical work in the observatory, securing facility in making and reducing observations. Two terms (5).
Courses: 148. Descriptive Astronomy - A study of the fundamental facts and principles of the subject with solution of problems; observatory visits. Second term (3).
149. Practical Astronomy - Study of instruments used, methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each student makes his own observations and computations in illustration of the problems studied. As this study is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First term (3).
Summer school in astronomy noted.
Known Alumni positions related to astronomy listed in this register:
Richard Hawley Tucker, C.E. class of 1879 is listed as Astronomer in charge, Southern Observatory, Carnegie Institution, Dudley Observatory, Albany, NY.
Eric Doolittle, C.E. class of 1891 is listed as Instructor in Astronomy at the Flower Astronomical Observatory, Philadelphia, PA.

1911-1912 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy, John Hutcheson Ogburn, C.E. Assistant Professor in Mathematics and Astronomy, John E. Stocker, B.S., M.S., Assistant Professor of Mathematics and Astronomy, Joseph B. Reynolds, B.A., Instructor in Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.

For Courses in which Geological Sciences predominate astronomy is listed as a senior elective.
For Courses in which physics and mathematics predominate astronomy is listed as either junior or senior elective.
In the fifth and sixth years of the B.A. and the Civil Engineering Course astronomy is listed in junior and senior years.
List of studies in Mathematics and Astronomy: Practical Astronomy taught by Prof. Thornburg – The work embraces: a) The study of the instruments and method used to determine time, latitude, longitude, and azimuth; b) Practical work in the observatory, securing facility in making and reducing observations. Two terms (5).
Courses: 148. Descriptive Astronomy - A study of the fundamental facts and principles of the subject with solution of problems; observatory visits. Second term (3).
149. Practical Astronomy. Study of instruments used, methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each student makes his own observations and computations in illustration of the problems studied. As this study is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First term (3).
Summer school in astronomy noted.
Known Alumni positions related to astronomy listed in this register:
Richard Hawley Tucker, C.E. class of 1879 is listed as Astronomer at Lick Observatory on Mt. Hamilton, CA
Eric Doolittle, C.E. class of 1891 is listed as Assistant Professor in Astronomy at the Flower Astronomical Observatory, Philadelphia, PA.

1912-1913 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy, John Hutcheson Ogburn, C.E. Assistant Professor in Mathematics and Astronomy, Joseph B. Reynolds, B.A., Instructor in Mathematics and Astronomy, John E. Stocker, B.S., M.S., Assistant Professor of Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
For Courses in which Geological Sciences predominate astronomy is listed as a senior elective.
For courses in which physics and mathematics predominate astronomy is listed as either junior or senior elective.
In the fifth and sixth years of the B.A. and the Civil Engineer course astronomy is listed in junior and senior years of Civil Engineering course.
List of studies in Mathematics and Astronomy: Practical Astronomy taught by Prof. Thornburg – The work embraces: a) The study of the instruments and method used to determine time, latitude, longitude, and azimuth; b) Practical work in the observatory, securing facility in making and reducing observations. Two terms (5).
Courses: 148. Descriptive Astronomy - A study of the fundamental facts and principles of the subject with solution of problems; observatory visits. Second term (3).
149. Practical Astronomy - Study of instruments used, methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in

which each student makes his own observations and computations in illustration of the problems studied. As this study is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First term (3).
Summer school in astronomy noted.
Notes about Alumni no longer supported in the registers.

1913-1914 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy, John Hutcheson Ogburn, C.E. Assistant Professor in Mathematics and Astronomy, Joseph B. Reynolds, B.A., Instructor in Mathematics and Astronomy, John E. Stocker, B.S., M.S., Assistant Professor of Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
For Courses in which Geological Sciences predominate astronomy is listed as a senior elective.
For courses in which physics and mathematics predominate astronomy is listed as either junior or senior elective.
In the fifth and sixth years of the B.A. and the Civil Engineering course astronomy is listed in junior and senior years.
List of studies in Mathematics and Astronomy: Practical Astronomy taught by Prof. Thornburg – The work embraces: a) The study of the instruments and method used to determine time, latitude, longitude, and azimuth; b) Practical work in the observatory, securing facility in making and reducing observations. Two terms (5).
Courses: 148. Descriptive Astronomy - A study of the fundamental facts and principles of the subject with solution of problems; observatory visits. Second term (3).
149. Practical Astronomy - Study of instruments used, methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each student makes his own observations and computations in illustration of the problems studied. As this study is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First term (3).
Summer school in astronomy noted.

1914-1915 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy and Secretary of the Faculty, John Hutcheson Ogburn, C.E. Professor in Mathematics and Astronomy, Joseph B. Reynolds, B.A., Instructor in Mathematics and Astronomy, John E. Stocker, B.S., M.S., Assistant Professor of Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for B.A. or B.S. in any Course of Arts and Science.
For Courses in which Geological Sciences predominate astronomy is listed as a senior elective.
For courses in which physics and mathematics predominate astronomy is listed as either junior or senior elective.

In the fifth and sixth years of the B.A. and the Civil Engineering course astronomy is listed in junior and senior years.
List of studies in the Graduate School in Mathematics and Astronomy: Practical Astronomy taught by Prof. Thornburg – The work embraces: a) The study of the instruments and method used in the determine of time, latitude, longitude, and azimuth; b) Practical work in the observatory, securing facility in making and reducing observations. Two terms (5).
Courses: 148. Descriptive Astronomy - A study of the fundamental facts and principles of the subject with solution of problems; observatory visits. Second term (3).
149. Practical Astronomy - Study of instruments used, methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each student makes his own observations and computations in illustration of the problems studied. As this study is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First term (3).
Summer school in astronomy noted.

1915-1916 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy and Secretary of the Faculty, John Hutcheson Ogburn, C.E. Professor in Mathematics and Astronomy, Joseph B. Reynolds, B.A., Instructor in Mathematics and Astronomy, John E. Stocker, B.S., M.S., Assistant Professor of Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
For Courses in which Geological Sciences predominate astronomy is listed as a senior elective.
For courses in which physics and mathematics predominate astronomy is listed as either junior or senior elective.
In the fifth and sixth years of the B.A. and the Civil Engineer course astronomy is listed in junior and senior years.
List of studies in the Graduate School in Mathematics and Astronomy: Practical Astronomy taught by Prof. Thornburg – The work embraces: a) The study of the instruments and method used to determine time, latitude, longitude, and azimuth; b) Practical work in the observatory, securing facility in making and reducing observations. Two terms (5).
Courses: 148. Descriptive Astronomy - A study of the fundamental facts and principles of the subject with solution of problems; observatory visits. Second term (3).
149. Practical Astronomy. Study of instruments used, methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each student makes his own observations and computations in illustration of the problems studied. As this study is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First term (3).
Summer school in astronomy noted.

1916-1917 Register – Special Collections

Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy and Secretary of the Faculty, John Hutcheson Ogburn, C.E. Professor in Mathematics and Astronomy, Joseph B. Reynolds, B.A., Instructor in Mathematics and Astronomy, John E. Stocker, B.S., M.S., Assistant Professor of Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
For Courses in which Geological Sciences predominate astronomy is listed as a senior elective.
For courses in which physics and mathematics predominate astronomy is listed as either junior or senior elective.
In the fifth and sixth years of the B.A. and the Civil Engineering course astronomy is listed in junior and senior years.
List of studies in the Graduate School in Mathematics and Astronomy: Practical Astronomy taught by Prof. Thornburg – The work embraces: a) The study of the instruments and method used to determine of time, latitude, longitude, and azimuth; b) Practical work in the observatory, securing facility in making and reducing observations. Two terms (5).
Courses: 148. Descriptive Astronomy - A study of the fundamental facts and principles of the subject with solution of problems; observatory visits. Second term (3).
149. Practical Astronomy - Study of instruments used, methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each student makes his own observations and computations in illustration of the problems studied. As this study is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First term (3).
Summer school in astronomy noted.

1917-1918 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy and Secretary of the Faculty, John Hutcheson Ogburn, C.E. Professor in Mathematics and Astronomy, Joseph B. Reynolds, B.A., Instructor in Mathematics and Astronomy, John E. Stocker, B.S., M.S., Assistant Professor of Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
For Courses in which Geological Sciences predominate astronomy is listed as a senior elective.
For courses in which physics and mathematics predominate astronomy is listed as either junior or senior elective.
In the fifth and sixth years of the B.A. and the Civil Engineering course astronomy is listed in junior and senior years.
List of studies in the Graduate School in Mathematics and Astronomy: Practical Astronomy taught by Prof. Thornburg – The work embraces: a) The study of the instruments and method used to determine time, latitude, longitude, and azimuth; b) Practical work in the observatory, securing facility in making and reducing observations. Two terms (5).

Courses: 148. Descriptive Astronomy - A study of the fundamental facts and principles of the subject with solution of problems; observatory visits. Second term (3).
149. Practical Astronomy. Study of instruments used, methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each student makes his own observations and computations in illustration of the problems studied. As this study is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First term (3).
Summer school in astronomy noted.

1918-1919 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy and Secretary of the Faculty, John Hutcheson Ogburn, C.E. Professor in Mathematics and Astronomy, Joseph B. Reynolds, B.A., Instructor in Mathematics and Astronomy, John E. Stocker, B.S., M.S., Assistant Professor of Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives, for a B.A. or B.S. in any Course of Arts and Science.
For Courses in which Geological Sciences predominate astronomy is listed as a senior elective.
For courses in which physics and mathematics predominate astronomy is listed as either junior or senior elective.
In the fifth and sixth years of the B.A. and the Civil Engineering Course astronomy is listed in junior and senior years.
For the course in Ship Construction and Marine Transportation astronomy is listed in the sophomore and senior year.
List of studies in the Graduate School in Mathematics and Astronomy: Practical Astronomy taught by Prof. Thornburg – The work embraces: a) The study of the instruments and method used to determine time, latitude, longitude, and azimuth; b) Practical work in the observatory, securing facility in making and reducing observations. Two terms (5).
Courses: 148. Descriptive Astronomy - A study of the fundamental facts and principles of the subject with solution of problems; observatory visits. Second term (3).
149. Practical Astronomy - Study of instruments used, methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each student makes his own observations and computations in illustration of the problems studied. As this study is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First term (3)
Summer school in astronomy noted.

1919-1920 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy and Secretary of the Faculty, John Hutcheson Ogburn, C.E. Professor in Mathematics and Astronomy, Joseph B. Reynolds, B.A., Instructor in Mathematics and Astronomy, John E. Stocker, B.S., M.S., Assistant Professor of Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.

Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
For Courses in which Geological Sciences predominate astronomy is listed as a senior elective.
For courses in which physics and mathematics predominate astronomy is listed as either junior or senior elective.
In the fifth and sixth years of the B.A. and the Civil Engineering course astronomy is listed in junior and senior years.
For the course in Ship Construction and Marine Transportation astronomy is listed in the sophomore and senior year.
List of studies in the Graduate School in Mathematics and Astronomy: Practical Astronomy taught by Prof. Thornburg – The work embraces: a) The study of the instruments and method used to determine time, latitude, longitude, and azimuth; b) Practical work in the observatory, securing facility in making and reducing observations. Two terms (5).
Courses: 150. Descriptive Astronomy - A study of the fundamental facts and principles of the subject with solution of problems; observatory visits. Second term (3).
151. Practical Astronomy - Study of instruments used, methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each student makes his own observations and computations in illustration of the problems studied. As this study is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First term (3).
Summer school in astronomy noted.

1920's

1920-1921 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy and Secretary of the Faculty, John Hutcheson Ogburn, C.E. Professor in Mathematics and Astronomy, Joseph B. Reynolds, B.A., Instructor in Mathematics and Astronomy, John E. Stocker, B.S., M.S., Assistant Professor of Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
For Courses in which Geological Sciences predominate astronomy is listed as a senior elective.
For courses in which physics and mathematics predominate astronomy is listed as either junior or senior elective.
In the fifth and sixth years of the B.A. and the Civil Engineering course astronomy is listed as well as in junior and senior years.
For the course in Ship Construction and Marine Transportation astronomy is listed in the sophomore and senior year.
List of studies in the Graduate School in Mathematics and Astronomy: Practical Astronomy taught by Prof. Thornburg – The work embraces: a) The study of the instruments and method used to determine time, latitude, longitude, and azimuth; b)

Practical work in the observatory, securing facility in making and reducing observations. Two terms (5).
Courses: 150. Descriptive Astronomy - A study of the fundamental facts and principles of the subject with solution of problems; observatory visits. Second term (3).
151. Practical Astronomy - Study of instruments used, methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each student makes his own observations and computations in illustration of the problems studied. As this study is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First term (3).
Summer school in astronomy noted.

1921-1922 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy and Secretary of the Faculty, John Hutcheson Ogburn, C.E. Professor in Mathematics and Astronomy, Joseph B. Reynolds, B.A., Instructor in Mathematics and Astronomy, John E. Stocker, B.S., M.S., Assistant Professor of Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
For Courses in which Geological Sciences predominate astronomy is listed as a senior elective.
For courses in which physics and mathematics predominate astronomy is listed as either junior or senior elective.
In the fifth and sixth years of the B.A. and the Civil Engineering course astronomy is listed as well as in junior and senior years.
For the course in Ship Construction and Marine Transportation astronomy is listed in the sophomore and senior year.
List of studies in the Graduate School in Mathematics and Astronomy: Practical Astronomy taught by Prof. Thornburg – The work embraces: a) The study of the instruments and method used to determine time, latitude, longitude, and azimuth; b) Practical work in the observatory, securing facility in making and reducing observations. Two terms (5).
Courses: 150. Descriptive Astronomy - A study of the fundamental facts and principles of the subject with solution of problems; observatory visits. Second term (3).
151. Practical Astronomy - Study of instruments used, methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each student makes his own observations and computations in illustration of the problems studied. As this study is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First term (3)
Summer school in astronomy noted.

1922-1923 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy and Secretary of the Faculty, John Hutcheson Ogburn, C.E. Professor in Mathematics and Astronomy, Joseph B. Reynolds, B.A., Instructor in Mathematics and Astronomy, John E. Stocker, B.S., M.S., Assistant Professor of Mathematics and Astronomy.

Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
For Courses in which Geological Sciences predominate astronomy is listed as a senior elective.
For courses in which physics and mathematics predominate astronomy is listed as either junior or senior elective.
In the fifth and sixth years of the B.A. and the Civil Engineering course astronomy is listed in junior year.
For the course in Ship Construction and Marine Transportation astronomy is listed in the sophomore and senior year.
List of studies in the Graduate School in Mathematics and Astronomy: Practical Astronomy taught by Prof. Thornburg – The work embraces: a) The study of the instruments and method used to determine time, latitude, longitude, and azimuth; b) Practical work in the observatory, securing facility in making and reducing observations. Two terms (5).
Courses: 150. Descriptive Astronomy - A study of the fundamental facts and principles of the subject with solution of problems; observatory visits. Second term (3).
151. Practical Astronomy - Study of instruments used, methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each student makes his own observations and computations in illustration of the problems studied. As this study is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First term (3).
Summer school in astronomy noted.

1923-1924 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy and Secretary of the Faculty, John Hutcheson Ogburn, C.E. Professor in Mathematics and Astronomy, Joseph B. Reynolds, B.A., Associate Professor in Mathematics and Astronomy, John E. Stocker, B.S., M.S., Associate Professor of Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
For Courses in which Geological Sciences predominate astronomy is listed as a senior elective.
For courses in which physics and mathematics predominate astronomy is listed as either junior or senior elective.
In the fifth and sixth years of the B.A. and the Civil Engineer course astronomy is listed in junior year.
For the course in Ship Construction and Marine Transportation astronomy is listed in the junior year.
List of studies in the Graduate School in Mathematics and Astronomy: Practical Astronomy taught by Prof. Thornburg – The work embraces: a) The study of the instruments and method used to determine time, latitude, longitude, and azimuth; b)

Practical work in the observatory, securing facility in making and reducing observations. Two terms (5).
Courses: 150. Descriptive Astronomy - A study of the fundamental facts and principles of the subject with solution of problems; observatory visits. Second term (3).
151. Practical Astronomy - Study of instruments used, methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each student makes his own observations and computations in illustration of the problems studied. As this study is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First term (3).
Summer school in astronomy noted.

1924-1925 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy and Secretary of the Faculty, John Hutcheson Ogburn, C.E., Professor in Mathematics and Astronomy, Joseph B. Reynolds, B.A., Associate Professor in Mathematics and Astronomy, John E. Stocker, B.S., M.S., Associate Professor of Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in a Course of Arts and Science.
For Courses in which Geological Sciences predominate astronomy is listed as a senior elective.
For courses in which physics and mathematics predominate astronomy is listed as either junior or senior elective.
In the fifth and sixth years of the B.A. and the Civil Engineering course astronomy is listed in junior year.
For the course in Marine Engineering and Transportation astronomy is listed in the junior year.
List of studies in the Graduate School in Mathematics and Astronomy: Practical Astronomy taught by Prof. Thornburg and Ogburn – The work embraces: a) The study of the instruments and method used to determine time, latitude, longitude, and azimuth; b) Practical work in the observatory, securing facility in making and reducing observations. Two terms (5).
Courses: 150. Descriptive Astronomy - A study of the fundamental facts and principles of the subject with solution of problems; observatory visits. Second term (3).
151. Practical Astronomy - Study of instruments used, methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each student makes his own observations and computations in illustration of the problems studied. As this study is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First term (3).
Summer school in astronomy noted.

1925-1926 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy and Secretary of the Faculty, John Hutcheson Ogburn, C.E., Professor in Mathematics and Astronomy, Joseph B. Reynolds, B.A., Associate Professor in Mathematics and

Astronomy, John E. Stocker, B.S., M.S., Associate Professor of Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
For Courses in which Geological Sciences predominate astronomy is listed as a senior elective.
For courses in which physics and mathematics predominate astronomy is listed as either junior or senior elective.
In the fifth and sixth years of the B.A. and the Civil Engineering course astronomy is listed in junior year.
For the course in Marine Engineering and Transportation astronomy is listed in the junior year.
List of studies in the Graduate School in Mathematics and Astronomy: Practical Astronomy taught by Prof. Thornburg and Ogburn – The work embraces: a) The study of the instruments and method used to determine time, latitude, longitude, and azimuth; b) Practical work in the observatory, securing facility in making and reducing observations. Two terms (5).
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy - An elementary illustrated lecture course. Open to all students. May not be substituted for Astr. 2. Second Term (3).
Astr 2. General Astronomy - Fundamental facts and principles of the subjects with solution of problems using calculus; observatory visits. Second term (3).
Astr 3. Practical Astronomy - Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each students makes his own observations and computations in illustrations of the problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3).
For Graduates:
Astr 101. Advanced Practical Astronomy - The study of instruments and methods used in the determination of time, latitude, longitude, and azimuth; practical work in the observatory, to give facility in making and reducing observations. First term (3) Prof. Ogburn.
Astr 102. Advanced Practical Astronomy - Continuation of Astr 101. Second Term (5) Prof. Ogburn.
Summer school in astronomy noted.

1926-1927 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy and Secretary of the Faculty, John Hutcheson Ogburn, C.E., Professor in Mathematics and Astronomy, Joseph B. Reynolds, B.A., M.A., Ph.D. Associate Professor in Mathematics and Astronomy (On leave of absence), John E. Stocker, B.S., M.S., Associate Professor of Mathematics and Astronomy, Lloyd Leroy Smail, A.B., A.M., Ph.D., Associate Professor of Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.

Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
For courses in which Geological Sciences predominate astronomy is listed as a senior elective.
For courses in which physics and mathematics predominate astronomy is listed as either junior or senior elective.
In the fifth and sixth years of the B.A. and the Civil Engineering course astronomy is listed in junior year.
For the course in Marine Engineering and Transportation astronomy is listed in the junior year.
List of studies in the Graduate School in Mathematics and Astronomy: Practical Astronomy taught by Prof. Thornburg and Ogburn – The work embraces: a) The study of the instruments and method used in the determine of time, latitude, longitude, and azimuth; b) Practical work in the observatory, securing facility in making and reducing observations. Two terms (5).
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy - An elementary illustrated lecture course. Open to all students. May not be substituted for Astr. 2. Second Term (3).
Astr 2. General Astronomy - Fundamental facts and principles of the subjects with solution of problems using calculus; observatory visits. Second term (3).
Astr 3. Practical Astronomy - Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each students makes his own observations and computations in illustrations of the problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3).
For Graduates:
Astr 101. Advanced Practical Astronomy - The study of instruments and methods used in the determination of time, latitude, longitude, and azimuth; practical work in the observatory, to give facility in making and reducing observations. First term (3) Prof. Ogburn.
Astr 102. Advanced Practical Astronomy - Continuation of Astr 101. Second Term (5) Prof. Ogburn.
Summer session – Optional Courses July 6 to August 16 – Descriptive Astronomy (3)

1927-1928 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy and Secretary of the Faculty, John Hutcheson Ogburn, C.E., Professor in Mathematics and Astronomy, John E. Stocker, B.S., M.S., Associate Professor of Mathematics and Astronomy, Lloyd Leroy Smail, A.B., A.M., Ph.D., Associate Professor of Mathematics and Astronomy, Tomlinson Fort, A.B., A.M., Ph.D., Head of the Department of Mathematics and Astronomy, Leland Spencer Barnes, A.B., Assistant in Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.

Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy - An elementary illustrated lecture course. Open to all students. May not be substituted for Astr. 2. Second Term (3).
Astr 2. General Astronomy - Fundamental facts and principles of the subjects with solution of problems using calculus; observatory visits. Second term (3).
Astr 3. Practical Astronomy - Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each students makes his own observations and computations in illustrations of the problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3).
For Graduates:
Astr 101. Advanced Practical Astronomy. The study of instruments and methods used in the determination of time, latitude, longitude, and azimuth; practical work in the observatory, to give facility in making and reducing observations. First term (3) Prof. Ogburn,
Astr 102. Advanced Practical Astronomy. Continuation of Astr 101. Second Term (5) Prof. Ogburn.
Specific major in "Mathematics and Astronomy" listed.
Summer session – Optional Courses July 7 to August 17 – Descriptive Astronomy (3).

1928-1929 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy and Secretary of the Faculty, John Hutcheson Ogburn, C.E., Professor in Mathematics and Astronomy, Tomlinson Fort, A.B., A.M., Ph.D., Head of the Department of Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy - An elementary illustrated lecture course. Open to all students. May not be substituted for Astr. 2. Second Term (3).
Astr 2. General Astronomy - Fundamental facts and principles of the subjects with solution of problems using calculus; observatory visits. Second term (3).
Astr 3. Practical Astronomy - Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each students makes his own observations and computations in illustrations of the problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3).
For Graduates:
Astr 201. Astronomy Seminar - The study of instruments and methods used in the determination of time, latitude, longitude, and azimuth; practical work in the observatory, to give facility in making and reducing observations (3) Prof. Ogburn,
Astr 202. Astronomy Seminar - Continuation of Astr 201. (3) Prof. Ogburn.
Specific major in "Mathematics and Astronomy" listed.

Summer session – Optional Courses July 5 to August 15 – Descriptive Astronomy (3).
Ernest W. Brown Astronomical Society listed as a student society.

1929-1930 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy and Secretary of the Faculty, John Hutcheson Ogburn, C.E., Professor in Mathematics and Astronomy, John E. Stocker, B.S., M.S., Associate Professor of Mathematics and Astronomy, Tomlinson Fort, A.B., A.M., Ph.D., Head of the Department of Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy. An elementary illustrated lecture course. Open to all students. May not be substituted for Astr. 2. Second Term (3).
Astr 2. General Astronomy. Fundamental facts and principles of the subjects with solution of problems using calculus; observatory visits. Second term (3).
Astr 3. Practical Astronomy. Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each students makes his own observations and computations in illustrations of the problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3).
For Graduates:
Astr 201. Astronomy Seminar - The study of instruments and methods used in the determination of time, latitude, longitude, and azimuth; practical work in the observatory, to give facility in making and reducing observations (3) Prof. Ogburn,
Astr 202. Astronomy Seminar - Continuation of Astr 101. (3) Prof. Ogburn.
Specific major in "Mathematics and Astronomy" listed.
Summer session – Optional Courses July 1 to August 10 – Descriptive Astronomy (3).
Ernest W. Brown Astronomical Society listed as a student society.

1930's

1930-1931 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Professor of Mathematics and Astronomy and Secretary of the Faculty, John Hutcheson Ogburn, C.E., Professor in Mathematics and Astronomy, John E. Stocker, B.S., M.S., Associate Professor of Mathematics and Astronomy, Tomlinson Fort, A.B., A.M., Ph.D., Head of the Department of Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy - An elementary illustrated lecture course. Open to all students. May not be substituted for Astr. 2. Second Term (3).

Astr 2. General Astronomy - Fundamental facts and principles of the subjects with solution of problems using calculus; observatory visits. Second term (3).
Astr 3. Practical Astronomy - Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each students makes his own observations and computations in illustrations of the problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3).
For Graduates:
Astr 201. Astronomy Seminar - The study of instruments and methods used in the determination of time, latitude, longitude, and azimuth; practical work in the observatory, to give facility in making and reducing observations (3) Prof. Ogburn.
Astr 202. Astronomy Seminar - Continuation of Astr 201. (3) Prof. Ogburn.
Specific major in "Mathematics and Astronomy" listed.
Summer session – Optional Courses June 30 to August 9 – Descriptive Astronomy (3).
Ernest W. Brown Astronomical Society as a student society.

1931-1932 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Emeritus Professor of Mathematics and Astronomy and Secretary of the Faculty, John Hutcheson Ogburn, C.E., Professor in Mathematics and Astronomy, John E. Stocker, B.S., M.S., Associate Professor of Mathematics and Astronomy, Tomlinson Fort, A.B., A.M., Ph.D., Head of the Department of Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy - An elementary illustrated lecture course. Open to all students. May not be substituted for Astr. 2. Second Term (3).
Astr 2. General Astronomy - The solar system, the sidereal system; two hours a week. Practical work in the observatory, acquiring facility in use of instruments in actual astronomical observation; one hour a week. Conference. Preparation for and interpreting results, study of star charts and stellar spectra, one hour a week. First Semester (3).
Astr 3. Practical Astronomy - Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each students makes his own observations and computations in illustrations of the problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3).
For Graduates:
Astr 201. Astronomy Seminar - The mathematical theory of instruments and methods used in the determination of time, latitude, longitude, and azimuth; practical work in the observatory, to give facility in taking and reducing observation. First semester. Given when sufficient demand. (3) Prof. Ogburn.
Astr 202. Astronomy Seminar - Continuation of Astr 201. (3) Prof. Ogburn.
Specific major in "Mathematics and Astronomy" listed.

Summer session – Optional Courses June 29 to August 8 – Descriptive Astronomy (3)
Ernest W. Brown Astronomical Society listed as a student society.

1932-1933 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Emeritus Professor of Mathematics and Astronomy and Secretary of the Faculty, John Hutcheson Ogburn, C.E. Professor in Mathematics and Astronomy, John E. Stocker, B.S., M.S., Associate Professor of Mathematics and Astronomy, Tomlinson Fort, A.B., A.M., Ph.D., Head of the Department of Mathematics and Astronomy, Ralph Newcomb VanArnam, E.E., M.S., Instructor in Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy - An elementary illustrated lecture course. Open to all students. May not be substituted for Astr. 2. Second Term (3).
Astr 2. General Astronomy - The solar system, the sidereal system; two hours a week. Practical work in the observatory, acquiring facility in use of instruments in actual astronomical observation; one hour per week. Conference. Preparation for and interpreting results, study of star charts and stellar spectra, one hour a week. First Semester (3).
Astr 3. Practical Astronomy - Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each students makes his own observations and computations in illustrations of the problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3).
For Graduates:
Astr 201. Astronomy Seminar - The mathematical theory of instruments and methods used in the determination of time, latitude, longitude, and azimuth; practical work in the observatory, to give facility in taking and reducing observation. First Semester. Given when sufficient demand. (3) Prof. Ogburn.
Astr 202. Astronomy Seminar - Continuation of Astr 201. (3) Prof. Ogburn.
Specific major in "Mathematics and Astronomy" listed.
Summer session – Optional Courses June 29 to August 8 – Descriptive Astronomy (3).
Ernest W. Brown Astronomical Society listed as a student society.

1933-1934 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Emeritus Professor of Mathematics and Astronomy and Secretary of the Faculty, John Hutcheson Ogburn, C.E., Professor in Mathematics and Astronomy, John E. Stocker, B.S., M.S., Associate Professor of Mathematics and Astronomy, Tomlinson Fort, A.B., A.M., Ph.D., Head of the Department of Mathematics and Astronomy, Ralph Newcomb VanArnam, E.E., M.S., Instructor in Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.

Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy - An elementary illustrated lecture course. Open to all students. May not be substituted for Astr. 2. Second Term (3).
Astr 2. General Astronomy - The solar system, the sidereal system; two hours a week. Practical work in the observatory, acquiring facility in use of instruments in actual astronomical observation; one hour per week. Conference. Preparation for and interpreting results, study of star charts and stellar spectra, one hour per week. First Semester (3).
Astr 3. Practical Astronomy - Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each students makes his own observations and computations in illustrations of the problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3).
For Graduates:
Astr 201. Astronomy Seminar - The mathematical theory of instruments and methods used in the determination of time, latitude, longitude, and azimuth; practical work in the observatory, to give facility in taking and reducing observation. First semester. Give when sufficient demand. (3) Prof. Ogburn.
Astr 202. Astronomy Seminar - Continuation of Astr 201. (3) Prof. Ogburn.
Specific major in "Mathematics and Astronomy" listed.
Summer session – Optional Courses July 5 to August 15 – Descriptive Astronomy (3)
Ernest W. Brown Astronomical Society listed as a student society.

1934-1935 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Emeritus Professor of Mathematics and Astronomy and Secretary of the Faculty, John Hutcheson Ogburn, C.E., Professor in Mathematics and Astronomy, John E. Stocker, B.S., M.S., Associate Professor of Mathematics and Astronomy, Tomlinson Fort, A.B., A.M., Ph.D., Head of the Department of Mathematics and Astronomy, Ralph Newcomb VanArnam, E.E., M.S., Instructor in Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy - An elementary illustrated lecture course. Open to all students. May not be substituted for Astr. 2. Second Term (3).
Astr 2. General Astronomy - The solar system, the sidereal system; two hours a week. Practical work in the observatory, acquiring facility in use of instruments in actual astronomical observation; one hour a week. Conference. Preparation for and interpreting results, study of star charts and stellar spectra, one hour a week. First semester. (3).
Astr 3. Practical Astronomy - Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each students makes his own observations and computations in illustrations of the

problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3).
For Graduates:
Astr 201. Astronomy Seminar - The mathematical theory of instruments and methods used in the determination of time, latitude, longitude, and azimuth; practical work in the observatory, to give facility in taking and reducing observation. First semester. Given when sufficient demand. (3) Prof. Ogburn.
Astr 202. Astronomy Seminar - Continuation of Astr 201. (3) Prof. Ogburn.
Specific major in "Mathematics and Astronomy" listed.

1935-1936 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Emeritus Professor of Mathematics and Astronomy and Secretary of the Faculty, John Hutcheson Ogburn, C.E., Professor in Mathematics and Astronomy, John E. Stocker, B.S., M.S., Associate Professor of Mathematics and Astronomy, Tomlinson Fort, A.B., A.M., Ph.D., Head of the Department of Mathematics and Astronomy, Ralph Newcomb VanArnam, E.E., M.S., Instructor in Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy - An elementary illustrated lecture course. Open to all students. May not be substituted for Astr. 2. Second Term (3).
Astr 2. General Astronomy - The solar system, the sidereal system; two hours a week. Practical work in the observatory, acquiring facility in use of instruments in actual astronomical observation; one hour a week. Conference. Preparation for and interpreting results, study of star charts and stellar spectra, one hour a week. First semester (3).
Astr 3. Practical Astronomy - Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each students makes his own observations and computations in illustrations of the problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3).
For Graduates:
Astr 201. Astronomy Seminar - The mathematical theory of instruments and methods used in the determination of time, latitude, longitude, and azimuth; practical work in the observatory, to give facility in taking and reducing observation. First semester. Given when sufficient demand. (3) Prof. Ogburn.
Astr 202. Astronomy Seminar - Continuation of Astr 201. (3) Prof. Ogburn.
Specific major in "Mathematics and Astronomy" listed.

1936-1937 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Emeritus Professor of Mathematics and Astronomy and Secretary of the Faculty, John Hutcheson Ogburn, C.E., Professor in Mathematics and Astronomy, Tomlinson Fort, A.B., A.M., Ph.D., Head of the

Department of Mathematics and Astronomy, Ralph Newcomb VanArnam, E.E., M.S., Instructor in Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy - An elementary illustrated lecture course. Open to all students. May not be substituted for Astr. 2. Second Term (3).
Astr 2. General Astronomy - The solar system, the sidereal system; two hours a week. Practical work in the observatory, acquiring facility in use of instruments in actual astronomical observation; one hour a week. Conference. Preparation for and interpreting results, study of star charts and stellar spectra, one hour a week. First semester (3).
Astr 3. Practical Astronomy - Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each students makes his own observations and computations in illustrations of the problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3).
For Graduates:
Astr 201. Astronomy Seminar - The mathematical theory of instruments and methods used in the determination of time, latitude, longitude, and azimuth; practical work in the observatory, to give facility in taking and reducing observation. First semester. Give when sufficient demand. (3) Prof. Ogburn.
Astr 202. Astronomy Seminar - Continuation of Astr 201. (3) Prof. Ogburn.
Specific major in "Mathematics and Astronomy" listed with 30 credits in mathematics and astronomy.

1937-1938 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Emeritus Professor of Mathematics and Astronomy and Secretary of the Faculty, John Hutcheson Ogburn, C.E., Professor in Mathematics and Astronomy, Tomlinson Fort, A.B., A.M., Ph.D., Head of the Department of Mathematics and Astronomy, Ralph Newcomb VanArnam, E.E., M.S., Instructor in Mathematics and Astronomy, Joseph Benson Reynolds, Professor of Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy - An elementary illustrated lecture course. Open to all students. May not be substituted for Astr. 2. Second Term (3).
Astr 2. General Astronomy - The solar system, the sidereal system; two hours a week. Practical work in the observatory, acquiring facility in use of instruments in actual astronomical observation; one hour a week. Conference. Preparation for and interpreting results, study of star charts and stellar spectra, one hour a week. First semester (3).
Astr 3. Practical Astronomy - Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in

which each students makes his own observations and computations in illustrations of the problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3).
For Graduate:
Astr 201. Astronomy Seminar - The mathematical theory of instruments and methods used in the determination of time, latitude, longitude, and azimuth; practical work in the observatory, to give facility in taking and reducing observation. First semester. Give when sufficient demand. (3) Prof. Ogburn,
Astr 202. Astronomy Seminar. Continuation of Astr 201. (3) Prof. Ogburn.
Specific major in "Mathematics and Astronomy" listed with 30 credits in mathematics and astronomy.
Ernest W. Brown Astronomical Society listed as a student society.

1938-1939 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Emeritus Professor of Mathematics and Astronomy and Secretary of the Faculty, John Hutcheson Ogburn, C.E., Professor in Mathematics and Astronomy, Tomlinson Fort, A.B., A.M., Ph.D., Head of the Department of Mathematics and Astronomy, Ralph Newcomb VanArnam, E.E., M.S., Instructor in Mathematics and Astronomy, Joseph Benson Reynolds, Professor of Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr 2. General Astronomy - The solar system; the sidereal system, with an introduction to celestial mechanics and astrophysics (3).
For Graduates:
Astr 201. Astronomy Seminar - The study of instruments and methods used in the determination of time, latitude, longitude, and azimuth; practical work in the observatory, to give facility in making and reducing observations (3) Prof. Ogburn.
Astr 202. Astronomy Seminar - Continuation of Astr 201. (3) Prof. Ogburn.
Specific major in "Mathematics and Astronomy" listed with 30 credits in mathematics and astronomy.
Ernest W. Brown Astronomical Society listed as a student society.

1939-1940 Register – Special Collections
Instructors: Charles L. Thornburg, C.E., Ph.D., Emeritus Professor of Mathematics and Astronomy and Secretary of the Faculty, John Hutcheson Ogburn, C.E., Professor in Mathematics and Astronomy, Tomlinson Fort, A.B., A.M., Ph.D., Head of the Department of Mathematics and Astronomy, Ralph Newcomb VanArnam, E.E., M.S., Instructor in Mathematics and Astronomy, Joseph Benson Reynolds, Professor of Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy

Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr 2. General Astronomy - The solar system; the sidereal system, with an introduction to celestial mechanics and astrophysics (3).
Astr 3. Practical Astronomy - Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each students makes his own observations and computations in illustrations of the problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3).
Specific major in "Mathematics and Astronomy" listed with 30 credits in mathematics and astronomy.
Ernest W. Brown Astronomical Society listed as a student society.

1940's

1940-1941 Register – Special Collections
Instructors: John Hutcheson Ogburn, C.E., Emeritus Professor in Mathematics and Astronomy, Tomlinson Fort, A.B., A.M., Ph.D., Head of the Department of Mathematics and Astronomy, Ralph Newcomb VanArnam, E.E., M.S., Instructor in Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr 2. General Astronomy - The solar system; the sidereal system, with an introduction to celestial mechanics and astrophysics (3).
Astr 3. Practical Astronomy - Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each students makes his own observations and computations in illustrations of the problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3). Specific major in "Mathematics and Astronomy" listed with 30 credits in mathematics and astronomy.
Ernest W. Brown Astronomical Society listed as a student society.

1941-1942 Register – Special Collections
Instructors: John Hutcheson Ogburn, C.E., Emeritus Professor in Mathematics and Astronomy, Tomlinson Fort, A.B., A.M., Ph.D., Head of the Department of Mathematics and Astronomy, Ralph Newcomb VanArnam, E.E., M.S., Instructor in Mathematics and Astronomy.

Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr 2. General Astronomy - The solar system; the sidereal system, with an introduction to celestial mechanics and astrophysics (3).
Astr 3. Practical Astronomy - Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each students makes his own observations and computations in illustrations of the problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3).
Specific major in "Mathematics and Astronomy" listed with 30 credits in mathematics and astronomy.
Ernest W. Brown Astronomical Society listed as a student society.

1942-1943 Register – Special Collections
Instructors: John Hutcheson Ogburn, C.E., Emeritus Professor in Mathematics and Astronomy, Tomlinson Fort, A.B., A.M., Ph.D., Head of the Department of Mathematics and Astronomy, Ralph Newcomb VanArnam, E.E., M.S., Instructor in Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr 2. General Astronomy - The solar system; the sidereal system, with an introduction to celestial mechanics and astrophysics (3).
Astr 3. Practical Astronomy - Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each students makes his own observations and computations in illustrations of the problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3).
Specific major in "Mathematics and Astronomy" listed with 30 credit in mathematics and astronomy.
Ernest W. Brown Astronomical Society listed as a student society.

1943-1944 Register – Special Collections
Instructors: John Hutcheson Ogburn, C.E., Emeritus Professor in Mathematics and Astronomy, Tomlinson Fort, A.B., A.M., Ph.D., Head of the Department of Mathematics and Astronomy, Ralph Newcomb VanArnam, E.E., M.S., Instructor in Mathematics and Astronomy.

Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr 2. General Astronomy - The solar system; the sidereal system, with an introduction to celestial mechanics and astrophysics (3).
Astr 3. Practical Astronomy - Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each students makes his own observations and computations in illustrations of the problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3).
Specific major in "Mathematics and Astronomy" listed with 30 credit in mathematics and astronomy.
Ernest W. Brown Astronomical Society listed as a student society.

1944-1945 Register – Special Collections
Instructors: John Hutcheson Ogburn, C.E., Emeritus Professor in Mathematics and Astronomy, Tomlinson Fort, A.B., A.M., Ph.D., Head of the Department of Mathematics and Astronomy, Ralph Newcomb VanArnam, E.E., M.S., Instructor in Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr 2. General Astronomy - The solar system; the sidereal system, with an introduction to celestial mechanics and astrophysics (3).
Astr 3. Practical Astronomy - Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each students makes his own observations and computations in illustrations of the problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3).
Specific major in "Mathematics and Astronomy" listed with 30 credit in mathematics and astronomy.
Ernest W. Brown Astronomical Society listed as a student society.

1945-1946 Register – Special Collections
Instructors: John Hutcheson Ogburn, C.E,. Emeritus Professor in Mathematics and Astronomy, Tomlinson Fort, A.B., A.M., Ph.D., Head of the Department of Mathematics and Astronomy, Ralph Newcomb VanArnam, E.E., M.S., Instructor in Mathematics and Astronomy.

Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr 2. General Astronomy - The solar system; the sidereal system, with an introduction to celestial mechanics and astrophysics (3).
Astr 3. Practical Astronomy - Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each students makes his own observations and computations in illustrations of the problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3).
Specific major in "Mathematics and Astronomy" listed with 30 credits in mathematics and astronomy.
Ernest W. Brown Astronomical Society listed as a student society.

1946-1947 Register – Special Collections
Instructors: John Hutcheson Ogburn, C.E., Emeritus Professor in Mathematics and Astronomy, Tomlinson Fort, A.B., A.M., Ph.D., Head of the Department of Mathematics and Astronomy, Ralph Newcomb VanArnam, E.E., M.S., Instructor in Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr 2. General Astronomy - The solar system; the sidereal system, with an introduction to celestial mechanics and astrophysics (3).
Astr 3. Practical Astronomy - Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each students makes his own observations and computations in illustrations of the problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3).
Specific major in "Mathematics and Astronomy" listed with 30 credits in mathematics and astronomy.
Ernest W. Brown Astronomical Society listed as a student society.

1947-1948 Register – Special Collections
Instructors: John Hutcheson Ogburn, C.E., Emeritus Professor in Mathematics and Astronomy, Tomlinson Fort, A.B., A.M., Ph.D., Head of the Department of Mathematics and Astronomy, Ralph Newcomb VanArnam, E.E., M.S., Instructor in Mathematics and Astronomy.

Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr 2. General Astronomy - The solar system; the sidereal system, with an introduction to celestial mechanics and astrophysics (3).
Astr 3. Practical Astronomy - Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each students makes his own observations and computations in illustrations of the problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3).
Specific major in "Mathematics and Astronomy" listed with 30 credits in mathematics and astronomy.
Ernest W. Brown Astronomical Society listed as a student society.

1948-1949 Register – Special Collections
Instructors: John Hutcheson Ogburn, C.E., Emeritus Professor in Mathematics and Astronomy, Tomlinson Fort, A.B., A.M., Ph.D., Head of the Department of Mathematics and Astronomy, Ralph Newcomb VanArnam, E.E., M.S., Instructor in Mathematics and Astronomy.
Packer Hall 3rd and 4th floors reserved for Department of Mathematics and Astronomy.
Descriptive Astronomy and Practical Astronomy listed as junior and senior electives for a B.A. or B.S. in any Course of Arts and Science.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr 2. General Astronomy - The solar system; the sidereal system, with an introduction to celestial mechanics and astrophysics (3).
Astr 3. Practical Astronomy - Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each students makes his own observations and computations in illustrations of the problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3).
Astr 4. Stellar Astronomy and Astrophysics - Introduction to astrophysics; the sun considered as a star; physical characteristics of the stars; stellar motions; binary stars; theory of binary star orbits; stellar aggregations; cosmogony. First or second semester (3).
Specific major in "Mathematics and Astronomy" listed with 30 credits in mathematics and astronomy.
Ernest W. Brown Astronomical Society listed as a student society.

1949-1950 Register – Special Collections – not found – possible major restructure years as no register or catalog can be found, but are set up notably different and 1950 sees a new name to the announcement.

1950's

1950-1951 Catalog – Special Collections – First time named as "catalog" as it is today
Instructors: John Hutcheson Ogburn, C.E., Emeritus Professor in Mathematics and Astronomy, Ralph Newcomb VanArnam, E.E., M.S., Assistant in Mathematics and Astronomy.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr 2. General Astronomy - The solar system; the sidereal system, with an introduction to celestial mechanics and astrophysics (3).
Astr 3. Practical Astronomy - Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each students makes his own observations and computations in illustrations of the problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3).
Astr 4. Stellar Astronomy and Astrophysics - Introduction to astrophysics; the sun considered as a star; physical characteristics of the stars; stellar motions; binary stars; theory of binary star orbits; stellar aggregations; cosmogony. First or second semester (3).
Specific major in "Mathematics and Astronomy" listed with 30 credits in mathematics and astronomy.

1951-1952 Catalog – Special Collections
Instructors: John Hutcheson Ogburn, C.E., Emeritus Professor in Mathematics and Astronomy, Ralph Newcomb VanArnam, E.E., M.S., Assistant in Mathematics and Astronomy, Theron Albert Schwegler, B.S., Graduate Assistant in Mathematics and Astronomy, Robert Andrew Chisholm Lane, A.B., Graduate Assistant in Mathematics and Astronomy.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr 2. General Astronomy - The solar system; the sidereal system, with an introduction to celestial mechanics and astrophysics (3).
Astr 103. Practical Astronomy - Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each students makes his own observations and computations in illustrations of the problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3).

Astr 104. Stellar Astronomy and Astrophysics - Introduction to astrophysics; the sun considered as a star; physical characteristics of the stars; stellar motions; binary stars; theory of binary star orbits; stellar aggregations; cosmogony. First or second semester (3). Specific major in "Mathematics and Astronomy" listed with 30 credits in mathematics and astronomy.

1952-1953 Catalog – Special Collections
Instructors: John Hutcheson Ogburn, C.E., Emeritus Professor in Mathematics and Astronomy, Ralph Newcomb VanArnam, E.E., M.S., Assistant in Mathematics and Astronomy, Theron Albert Schwegler, B.S., Graduate Assistant in Mathematics and Astronomy, Robert Andrew Chisholm Lane, A.B., Graduate Assistant in Mathematics and Astronomy.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr – 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr 2. General Astronomy - The solar system; the sidereal system, with an introduction to celestial mechanics and astrophysics (3).
Astr 103. Practical Astronomy - Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each students makes his own observations and computations in illustrations of the problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3).
Astr 104. Stellar Astronomy and Astrophysics - Introduction to astrophysics; the sun considered as a star; physical characteristics of the stars; stellar motions; binary stars; theory of binary star orbits; stellar aggregations; cosmogony. First or second semester (3). Specific major in "Mathematics and Astronomy" listed with 30 credits in mathematics and astronomy.
Ernest W. Brown Astronomical Society as a student society.

1953-1954 Catalog – Special Collections
Instructors: John Hutcheson Ogburn, C.E., Emeritus Professor in Mathematics and Astronomy, Ralph Newcomb VanArnam, E.E., M.S., Assistant in Mathematics and Astronomy, George Franklin Feeman, B.S., Graduate Assistant in mathematics and Astronomy.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr 2. General Astronomy - The solar system; the sidereal system, with an introduction to celestial mechanics and astrophysics (3).
Astr 103. Practical Astronomy - Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each students makes his own observations and computations in illustrations of the problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3).

Astr 104. Stellar Astronomy and Astrophysics - Introduction to astrophysics; the sun considered as a star; physical characteristics of the stars; stellar motions; binary stars; theory of binary star orbits; stellar aggregations; cosmogony. First or second semester (3). Specific major in "Mathematics and Astronomy" listed with 30 credits in mathematics and astronomy.
Ernest W. Brown Astronomical Society as a student society.

1954-1955 Catalog – Special Collections
Instructors: John Hutcheson Ogburn, C.E., Emeritus Professor in Mathematics and Astronomy, Ralph Newcomb VanArnam, E.E., M.S., Assistant in Mathematics and Astronomy, George Franklin Feeman, B.S., M.S., Graduate Assistant in mathematics and Astronomy, John Franklin Burke, B. Sci., Graduate Assistant in Mathematics and Astronomy, Robert Cleland Carson, B.S., M.S., Ph.D., Instructor in Mathematics and Astronomy, Ervin Kenneth Dorff, B.A., Graduate Assistant in Mathematics and Astronomy, Thomas Francis Green, B.S., Graduate Assistant in Mathematics and Astronomy, Samuel Linial Gulden, B.S., M.A., Graduate Assistant in Mathematics and Astronomy.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr 2. General Astronomy - The solar system; the sidereal system, with an introduction to celestial mechanics and astrophysics (3).
Astr 103. Practical Astronomy - Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each students makes his own observations and computations in illustrations of the problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3).
Astr 104. Stellar Astronomy and Astrophysics - Introduction to astrophysics; the sun considered as a star; physical characteristics of the stars; stellar motions; binary stars; theory of binary star orbits; stellar aggregations; cosmogony. First or second semester (3). Specific major in "Mathematics and Astronomy" listed with 30 credits in mathematics and astronomy.
Ernest W. Brown Astronomical Society as a student society.

1955-1956 Catalog – Special Collections
Instructors: John Hutcheson Ogburn, C.E., Emeritus Professor in Mathematics and Astronomy, Ralph Newcomb VanArnam, E.E., M.S., Assistant in Mathematics and Astronomy, John Franklin Burke, B. Sci., Graduate Assistant in Mathematics and Astronomy, Robert Cleland Carson, B.S., M.S., Ph.D., Instructor in Mathematics and Astronomy, Ervin Kenneth Dorff, B.A., Graduate Assistant in Mathematics and Astronomy, Thomas Francis Green, B.S., Graduate Assistant in Mathematics and Astronomy, Samuel Linial Gulden, B.S., M.A., Instructor in Mathematics and Astronomy, Walter Franklin Old, B.A., Graduate Assistant in Mathematics and Astronomy, George Emil Raynor, B.S., M.A., Ph.D., Professor of Mathematics, Head of the Department of Mathematics and Astronomy.

Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr 2. General Astronomy - The solar system; the sidereal system, with an introduction to celestial mechanics and astrophysics (3).
Astr 103. Practical Astronomy - Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each students makes his own observations and computations in illustrations of the problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3).
Astr 104. Stellar Astronomy and Astrophysics - Introduction to astrophysics; the sun considered as a star; physical characteristics of the stars; stellar motions; binary stars; theory of binary star orbits; stellar aggregations; cosmogony. First or second semester (3).
Specific major in "Mathematics and Astronomy" listed with 30 credits in mathematics and astronomy.
Ernest W. Brown Astronomical Society as a student society.

1956-1957 Catalog – Special Collections
Instructors: John Hutcheson Ogburn, C.E., Emeritus Professor in Mathematics and Astronomy, Ralph Newcomb VanArnam, E.E., M.S., Assistant in Mathematics and Astronomy, George Emil Raynor, B.S., M.A., Ph.D., Professor of Mathematics, Head of the Department of Mathematics and Astronomy, Thomas Francis Green, B.S., Graduate Assistant in Mathematics and Astronomy, Ervin Kenneth Dorff, B.A., Graduate Assistant in Mathematics and Astronomy.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr 2. General Astronomy - The solar system; the sidereal system, with an introduction to celestial mechanics and astrophysics (3).
Astr 103. Practical Astronomy - Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each students makes his own observations and computations in illustrations of the problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3).
Astr 104. Stellar Astronomy and Astrophysics - Introduction to astrophysics; the sun considered as a star; physical characteristics of the stars; stellar motions; binary stars; theory of binary star orbits; stellar aggregations; cosmogony. First or second semester (3).
Specific major in "Mathematics and Astronomy" listed with 30 credits in mathematics and astronomy.
Ernest W. Brown Astronomical Society as a student society.

1957-1958 Catalog – Special Collections
Instructors: John Hutcheson Ogburn, C.E., Emeritus Professor in Mathematics and Astronomy, Ralph Newcomb VanArnam, E.E., M.S., Assistant in Mathematics and

Astronomy, George Emil Raynor, B.S., M.A., Ph.D., Professor of Mathematics, Head of the Department of Mathematics and Astronomy, Thomas Francis Green, B.S., Graduate Assistant in Mathematics and Astronomy, Ervin Kenneth Dorff, B.A., Graduate Assistant in Mathematics and Astronomy, Samuel Linial Gulden, B.S., M.A., Instructor in Mathematics and Astronomy.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr 2. General Astronomy - The solar system; the sidereal system, with an introduction to celestial mechanics and astrophysics (3).
Astr 103. Practical Astronomy - Instruments used; methods of taking and reducing observations to determine time, latitude, longitude, and azimuth; observatory work in which each students makes his own observations and computations in illustrations of the problems studied. As this course is primarily for civil engineers, the sextant and engineer's transit are the chief instruments employed in the observational work. First Term (3).
Astr 104. Stellar Astronomy and Astrophysics - Introduction to astrophysics; the sun considered as a star; physical characteristics of the stars; stellar motions; binary stars; theory of binary star orbits; stellar aggregations; cosmogony. First or second semester (3).
Specific major in "Mathematics and Astronomy" listed.
Ernest W. Brown Astronomical Society as a student society.

1958-1959 Catalog – Special Collections
Instructors: Ralph Newcomb VanArnam, E.E., M.S., Assistant in Mathematics and Astronomy, George Emil Raynor, B.S., M.A., Ph.D., Professor of Mathematics, Head of the Department of Mathematics and Astronomy, Samuel Linial Gulden, B.S., M.A., Instructor in Mathematics and Astronomy.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr. 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr. 2. General Astronomy - The solar system; the sidereal system, with an introduction to celestial mechanics and astrophysics (3).
Astr. 104. Introduction to Astrophysics - The sun considered as a star; physical characteristics of the stars; stellar motions; binary star; theory of binary star orbits; stellar aggregations; cosmogony (3).
Specific major in "Mathematics and Astronomy" listed.
Ernest W. Brown Astronomical Society as a student society.

1959-1960 Catalog – Special Collections
Instructors: Ralph Newcomb VanArnam, E.E., M.S., Assistant in Mathematics and Astronomy, George Emil Raynor, B.S., M.A., Ph.D., Professor of Mathematics, Head of the Department of Mathematics and Astronomy, Samuel Linial Gulden, B.S., M.A., Instructor in Mathematics and Astronomy.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr. 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).

Astr. 2. General Astronomy - The solar system; the sidereal system, with an introduction to celestial mechanics and astrophysics (3).
Astr. 104. Introduction to Astrophysics - The sun considered as a star; physical characteristics of the stars; stellar motions; binary star; theory of binary star orbits; stellar aggregations; cosmogony (3).
Specific major in "Mathematics and Astronomy" listed.
Ernest W. Brown Astronomical Society as a student society.
Notably much less information about the Sayre Observatory, possible this is around the time the trolley rendered it useless due to the vibrations of the track.

1960's

1960-1961 Catalog – Special Collections
Instructors: Ralph Newcomb VanArnam, E.E., M.S., Assistant in Mathematics and Astronomy, Samuel Linial Gulden, B.S., M.A., Instructor in Mathematics and Astronomy
Courses: All listed under Description of Courses for Mathematics Astronomy:
Astr. 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr. 2. General Astronomy - The solar system; the sidereal system, with an introduction to celestial mechanics and astrophysics (3).
Astr. 104. Introduction to Astrophysics - The sun considered as a star; physical characteristics of the stars; stellar motions; binary star; theory of binary star orbits; stellar aggregations; cosmogony (3).
Specific major in "Mathematics and Astronomy" listed.
Ernest W. Brown Astronomical Society as a student society.
Notably much less information about the Sayre Observatory, possible this is around the time the trolley rendered it useless due to the vibrations of the track.

1961-1962 Catalog – Special Collections
Instructors: Ralph Newcomb VanArnam, E.E., M.S., Assistant in Mathematics and Astronomy.
Courses: All listed under Description of Courses for Mathematics and Astronomy:
Astr. 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr. 2. General Astronomy - The solar system; the sidereal system, with an introduction to celestial mechanics and astrophysics (3).
Astr. 104. Introduction to Astrophysics - The sun considered as a star; physical characteristics of the stars; stellar motions; binary star; theory of binary star orbits; stellar aggregations; cosmogony (3).
Specific major in "Mathematics and Astronomy" listed.
Ernest W. Brown Astronomical Society as a student society.

1962-1963 Catalog – Special Collections
Instructors: Ralph Newcomb VanArnam, E.E., M.S., Associate Professor in Mathematics and Astronomy, Arthur Evertt Pitcher, A.B., A.M, Ph.D., Head of Department of Mathematics and Astronomy.

Courses: All listed under Description of Courses for Mathematics subsection Astronomy:
Astr. 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr. 2. General Astronomy - The solar system; the sidereal system, with an introduction to celestial mechanics and astrophysics (3).
Astr. 104. Introduction to Astrophysics - The sun considered as a star; physical characteristics of the stars; stellar motions; binary star; theory of binary star orbits; stellar aggregations; cosmogony (3).
Specific major in "Mathematics and Astronomy" listed.
Ernest W. Brown Astronomical Society as a student society.
Sayre Observatory – The observatory contains three rooms on the first floor, which house animal laboratories for research and teaching in the Psychology Department.

1963-1964 Catalog – Special Collections
Instructors: Ralph Newcomb VanArnam, E.E., M.S., Associate Professor in Mathematics and Astronomy, Arthur Evertt Pitcher, A.B., A.M, Ph.D., Head of Department of Mathematics and Astronomy.
Courses: All listed under Description of Courses for Mathematics subsection Astronomy:
Astr. 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr. 2. General Astronomy - The solar system; the sidereal system, with an introduction to celestial mechanics and astrophysics (3).
Astr. 104. Introduction to Astrophysics - The sun considered as a star; physical characteristics of the stars; stellar motions; binary star; theory of binary star orbits; stellar aggregations; cosmogony (3).
Specific major in "Mathematics and Astronomy" listed.
Ernest W. Brown Astronomical Society as a student society.
Sayre Observatory – The observatory contains three rooms on the first floor, which house animal laboratories for research, and teaching in the Psychology Department.

1964-1965 Catalog – Special Collections
Instructors: Ralph Newcomb VanArnam, E.E., M.S., Associate Professor in Mathematics and Astronomy and Secretary of the Faculty, Arthur Evertt Pitcher, A.B., A.M, Ph.D., Head of Department of Mathematics and Astronomy.
Courses: All listed under Description of Courses for Mathematics subsection Astronomy:
Astr. 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr. 2. General Astronomy - The solar system; the sidereal system, with an introduction to celestial mechanics and astrophysics (3).
Astr. 104. Introduction to Astrophysics - The sun considered as a star; physical characteristics of the stars; stellar motions; binary star; theory of binary star orbits; stellar aggregations; cosmogony (3).
Specific major in "Mathematics and Astronomy" listed.
Ernest W. Brown Astronomical Society as a student society.
Sayre Observatory – The observatory contains three rooms on the first floor, which house animal laboratories for research, and teaching in the Psychology Department.

1965-1966 Catalog – Special Collections
Instructors: Ralph Newcomb VanArnam, E.E., M.S., Associate Professor in Mathematics and Astronomy and Secretary of the Faculty, Arthur Evertt Pitcher, A.B., A.M, Ph.D., Head of Department of Mathematics and Astronomy.
Courses: All listed under Description of Courses for Mathematics subsection Astronomy:
Astr. 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr. 2. General Astronomy - The solar system; the sidereal system, with an introduction to celestial mechanics and astrophysics (3).
Astr. 104. Introduction to Astrophysics - The sun considered as a star; physical characteristics of the stars; stellar motions; binary star; theory of binary star orbits; stellar aggregations; cosmogony (3).
Specific major in "Mathematics and Astronomy" listed.
Ernest W. Brown Astronomical Society as a student society.
Sayre Observatory – The observatory contains three rooms on the first floor, which house animal laboratories for research, and teaching in the Psychology Department.

1966-1967 Catalog – Special Collections
Instructors: Ralph Newcomb VanArnam, E.E., M.S., Associate Professor in Mathematics and Astronomy and Secretary of the Faculty, Arthur Evertt Pitcher, A.B., A.M, Ph.D., Head of Department of Mathematics and Astronomy, George E. McCluskey, A.B., M.S., Ph.D., Assistant Professor of Astronomy.
Courses: All listed under Description of Courses for Mathematics subsection Astronomy:
Astr. 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr. 2. General Astronomy - The solar system; the sidereal system, with an introduction to celestial mechanics and astrophysics (3).
Astr. 104. Introduction to Astrophysics - The sun considered as a star; physical characteristics of the stars; stellar motions; binary star; theory of binary star orbits; stellar aggregations; cosmogony (3).
Astr. 250. Topics in Astronomy - A course covering one or more topics not covered in other courses (3).
Specific major in "Mathematics and Astronomy" listed.
Ernest W. Brown Astronomical Society as a student society.
Sayre Observatory – The observatory contains three rooms on the first floor, which house animal laboratories for research and teaching in the Psychology Department.

1967-1968 Catalog – Special Collections
Instructors: Ralph Newcomb VanArnam, E.E., M.S., Associate Professor in Mathematics and Astronomy and Secretary of the Faculty, Arthur Evertt Pitcher, A.B., A.M, Ph.D., Head of Department of Mathematics and Astronomy, George E. McCluskey, A.B., M.S., Ph.D., Assistant Professor of Astronomy.
Courses: All listed under Description of Courses for Mathematics subsection Astronomy:
Astr. 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).

Astr. 2. General Astronomy - The solar system; the sidereal system, with an introduction to celestial mechanics and astrophysics (3).
Astr. 104. Introduction to Astrophysics - The sun considered as a star; physical characteristics of the stars; stellar motions; binary star; theory of binary star orbits; stellar aggregations; cosmogony (3).
Astr. 250. Topics in Astronomy - A course covering one or more topics not covered in other courses (3).
Ernest W. Brown Astronomical Society as a student society.
Sayre Observatory – The observatory contains three rooms on the first floor, which house animal laboratories for research and teaching in the Psychology Department.

1968-1969 Catalog – Special Collections
Instructors: Ralph Newcomb VanArnam, E.E., M.S., Associate Professor in Mathematics and Astronomy and Secretary of the Faculty, Arthur Evertt Pitcher, A.B., A.M, Ph.D., Head of Department of Mathematics and Astronomy, George E. McCluskey, A.B., M.S., Ph.D., Assistant Professor of Astronomy.
Courses: All listed under Description of Courses for Mathematics subsection Astronomy:
Astr. 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr. 2. General Astronomy - The solar system; the sidereal system, with an introduction to celestial mechanics and astrophysics (3).
Astr. 104. Introduction to Astrophysics - The sun considered as a star; physical characteristics of the stars; stellar motions; binary star; theory of binary star orbits; stellar aggregations; cosmogony (3).
Astr. 250. Topics in Astronomy - A course covering one or more topics not covered in other courses (3).
Sayre Observatory – The observatory contains three rooms on the first floor, which house animal laboratories for research and teaching in the Psychology Department.

1969-1970 Catalog – Special Collections
Instructors: Ralph Newcomb VanArnam, E.E., M.S., Associate Professor Emeritus in Mathematics and Astronomy and Secretary of the Faculty, Arthur Evertt Pitcher, A.B., A.M, Ph.D., Head of Department of Mathematics and Astronomy, George E. McCluskey, A.B., M.S., Ph.D., Assistant Professor of Astronomy.
Courses: All listed under Description of Courses for Mathematics subsection Astronomy:
Astr. 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr. 104. Introduction to Astrophysics - The sun considered as a star; physical characteristics of the stars; stellar motions; binary star; theory of binary star orbits; stellar aggregations; cosmogony (3).
Astr. 250. Topics in Astronomy - A course covering one or more topics not covered in other courses (3).
Sayre Observatory – The observatory contains three rooms on the first floor, which house animal laboratories for research and teaching in the Psychology Department.

1970's

1970-1971 Catalog – Special Collections
Instructors: Ralph Newcomb VanArnam, E.E., M.S., Associate Professor Emeritus in Mathematics and Astronomy, George E. McCluskey, A.B., M.S., Ph.D., Associate Professor of Astronomy.
Courses: All listed under Description of Courses for Mathematics subsection Astronomy
Astr. 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr. 104. Introduction to Astrophysics - The sun considered as a star; physical characteristics of the stars; stellar motions; binary star; theory of binary star orbits; stellar aggregations; cosmogony (3).
Astr. 250. Topics in Astronomy - A course covering one or more topics not covered in other courses (3).
Sayre Observatory – The observatory contains three rooms on the first floor, which house animal laboratories for research and teaching in the Psychology Department.
There are many instances in this catalog that seem to indicate the department of mathematics only, rather than "Department of Mathematics and Astronomy".

1971-1973 Catalog – Special Collections
Instructors: Ralph Newcomb VanArnam, E.E., M.S., Associate Professor Emeritus in Mathematics and Astronomy, George E. McCluskey, A.B., M.S., Ph.D., Associate Professor of Astronomy.
Description of Courses: Division of Astronomy in Mathematics:
Astr. 1. Descriptive Astronomy - The earth as an astronomical body; the solar system; a brief introduction to sidereal astronomy (3).
Astr. 104. Introduction to Astrophysics - The sun considered as a star; physical characteristics of the stars; stellar motions; binary star; theory of binary star orbits; stellar aggregations; cosmogony (3).
Astr. 250. Topics in Astronomy - A course covering one or more topics not covered in other courses (3).
Sayre Observatory – The observatory contains three rooms on the first floor, which house animal laboratories for research and teaching in the Psychology Department.

1973-1975 Catalog – Special Collections
Instructors: George E. McCluskey, A.B., M.S., Ph.D., Associate Professor of Astronomy, Ralph Newcomb VanArnam, E.E., M.S., Associate Professor Emeritus in Mathematics and Astronomy.
Description of Courses: Division of Astronomy in Mathematics:
Astr 1. The Solar System (3) – A survey of our knowledge of the solar system.
Astr 2. Stellar Astronomy (3) – Survey of our knowledge of stars and stellar systems.
Astr 211. Stellar Structure and Evolution (3) – Physical processes in stellar interiors. theory of stellar evolution and interpretation of observations.
Astr 221. Stellar Atmospheres (3) – Theory of stellar spectra. Equation of transfer, model atmospheres, chemical abundances.
Astr 232. High Energy Astrophysics (3) – Relativistic plasmas, x-ray sources, quasars, pulsars, radio galaxies, origin and evolution of galaxies, current research.

Astr 242. Relativity and Cosmology (3) – Introduction to tensor analysis. Einstein's field equations origin and evolution of the universe, current research.

1975-1977 Catalog – Special Collections
Instructors: George E. McCluskey, A.B., M.S., Ph.D., Associate Professor of Astronomy, Ralph Newcomb VanArnam, E.E., M.S., Associate Professor Emeritus in Mathematics and Astronomy.
Description of Courses: Division of Astronomy in Mathematics:
Astr. 1 The Solar System (3) fall – A survey of our knowledge of the solar system.
Astr 2. Stellar Astronomy (3) spring – Survey of our knowledge of stars and stellar systems.
Astr 211. Stellar Structure and Evolution (3) fall, even numbered years – Physical processes in stellar interiors. Theory of stellar evolution and interpretation of observations.
Astr 221. Stellar Atmospheres (3) fall, odd numbered years – Theory of stellar spectra. Equation of transfer, model atmospheres, chemical abundances.
Astr 232. High Energy Astrophysics (3) spring, odd numbered years – Relativistic plasmas, x-ray sources, quasars, pulsars, radio galaxies, origin and evolution of galaxies, current research.
Astr 242. Relativity and Cosmology (3) spring, even numbered years – Introduction to tensor analysis. Einstein's field equations origin and evolution of the universe, current research.

1977-1979 Catalog – Special Collections
Instructors: George E. McCluskey, A.B., M.S., Ph.D., Professor of Astronomy, Ralph Newcomb VanArnam, E.E., M.S., Associate Professor Emeritus in Mathematics and Astronomy.
Description of Courses: Division of Astronomy in Mathematics:
Astr. 1 The Solar System (3) fall – A survey of our knowledge of the solar system.
Astr 2. Stellar Astronomy (3) spring – Survey of our knowledge of stars and stellar systems.
Astr 211. Stellar Structure and Evolution (3) fall, even numbered years – Physical processes in stellar interiors. Theory of stellar evolution and interpretation of observations. Astr 221. Stellar Atmospheres (3) fall, odd numbered years – Theory of stellar spectra. Equation of transfer, model atmospheres, chemical abundances.
Astr 232. High Energy Astrophysics (3) spring, odd numbered years – Relativistic plasmas, x-ray sources, quasars, pulsars, radio galaxies, origin and evolution of galaxies, current research.
Astr 242. Relativity and Cosmology (3) spring, even numbered years – Introduction to tensor analysis. Einstein's field equations origin and evolution of the universe, current research.
Minor in astronomy listed under mathematics requiring: PHY 11, Math 21, Math 22, Astr 2, Astr 211 or 221, and Astr 232 or 242.

1979-1981 Catalog – Special Collections

Instructors: George E. McCluskey, A.B., M.S., Ph.D., Professor of Astronomy, Ralph Newcomb VanArnam, E.E., M.S., Associate Professor Emeritus in Mathematics and Astronomy.
Description of Courses: Division of Astronomy in Mathematics:
Astr. 1 The Solar System (3) fall – A survey of our knowledge of the solar system.
Astr 2. Stellar Astronomy (3) spring – Survey of our knowledge of stars and stellar systems.
Astr 211. Stellar Structure and Evolution (3) fall, even numbered years – Physical processes in stellar interiors. Theory of stellar evolution and interpretation of observations. Astr 221. Stellar Atmospheres (3) fall, odd numbered years – Theory of stellar spectra. Equation of transfer, model atmospheres, chemical abundances.
Astr 232. High Energy Astrophysics (3) spring, odd numbered years – Relativistic plasmas, x-ray sources, quasars, pulsars, radio galaxies, origin and evolution of galaxies, current research.
Astr 242. Relativity and Cosmology (3) spring, even numbered years – Introduction to tensor analysis. Einstein's field equations origin and evolution of the universe, current research.
Minor in astronomy listed under mathematics requiring: PHY 11, Math 21, Math 22, Astr 2, Astr 211 or 221, and Astr 232 or 242.

1980's

1981-1983 Catalog – Special Collections
Instructors: George E. McCluskey, A.B., M.S., Ph.D., Professor of Astronomy, Ralph Newcomb VanArnam, E.E., M.S., Associate Professor Emeritus in Mathematics and Astronomy.
Courses: Under Astronomy, offered in the Department of Mathematics:
Astr. 1 The Solar System (3) fall – A survey of our knowledge of the solar system. Apollo lunar missions. Mariner missions to Mercury, Venus, and Mars. Viking missions to Mars, Missions to Jupiter and Saturn.
Astr 2. Stellar Astronomy (3) spring – Survey of our knowledge of stars and stellar systems. Observations and theory of pulsars, quasars, X-ray sources, gamma ray sources, neutron stars and black holes.
Astr 211. Stellar Structure and Evolution (3) fall, even numbered years – Physical processes in stellar interiors. Theory of stellar evolution and interpretation of observations. Binary star evolution. Theory of novae and supernovae.
Astr 221. Stellar Atmospheres (3) fall, odd numbered years – Observation and theory of stellar spectra. Model atmospheres and chemical abundances. Extended atmospheres, stellar winds and mass loss. Theory of gaseous nebulae.
Astr 232. High Energy Astrophysics (3) spring, odd numbered years – Observation and theory of X-ray and gamma-ray sources, quasars, pulsars, radio galaxies, neutron stars, black holes. Results from ultraviolet, X-ray and gamma-ray satellites.
Astr 242. Relativity and Cosmology (3) spring, even numbered years – Special and general relativity. Schwarzschild and Kerr black holes, Supermassive stars. Relativistic theories of the origin and evolution of the universe.

Minor in astronomy listed under mathematics requiring: PHY 11, Math 21, Math 22, Astr 2, Astr 211 or 221, and Astr 232 or 242.

1983-1985 Catalog – Special Collections
Instructors: George E. McCluskey, A.B., M.S., Ph.D., Professor of Astronomy and Mathematics.
Courses: Under Astronomy, offered in the Department of Mathematics:
Astr. 1 The Solar System (3) fall – A survey of our knowledge of the solar system. Apollo lunar missions. Mariner missions to Mercury, Venus, and Mars. Viking missions to Mars, Missions to Jupiter and Saturn.
Astr 2. Stellar Astronomy (3) spring – Survey of our knowledge of stars and stellar systems. Observations and theory of pulsars, quasars, X-ray sources, gamma ray sources, neutron stars and black holes.
Astr 211. Stellar Structure and Evolution (3) fall, even numbered years – Physical processes in stellar interiors. Theory of stellar evolution and interpretation of observations. Binary star evolution. Theory of novae and supernovae.
Astr 221. Stellar Atmospheres (3) fall, odd numbered years – Observation and theory of stellar spectra. Model atmospheres and chemical abundances. Extended atmospheres, stellar winds and mass loss. Theory of gaseous nebulae.
Astr 232. High Energy Astrophysics (3) spring, odd numbered years – Observation and theory of X-ray and gamma-ray sources, quasars, pulsars, radio galaxies, neutron stars, black holes. Results from ultraviolet, X-ray and gamma-ray satellites.
Astr 242. Relativity and Cosmology (3) spring, even numbered years – Special and general relativity. Schwarzschild and Kerr black holes, Supermassive stars. Relativistic theories of the origin and evolution of the universe.
Minor in astronomy listed under mathematics requiring: PHY 11, Math 21, Math 22, Astr 2, Astr 211 or 221, and Astr 232 or 242.

1985-1986 Catalog – Special Collections
Instructors: George E. McCluskey, A.B., M.S., Ph.D., Professor of Astronomy and Mathematics.
Courses: Under Astronomy, offered in the Department of Mathematics:
Astr. 1 The Solar System (3) fall – A survey of our knowledge of the solar system. Apollo lunar missions. Mariner missions to Mercury, Venus, and Mars. Viking missions to Mars, Missions to Jupiter and Saturn.
Astr 2. Stellar Astronomy (3) spring – Survey of our knowledge of stars and stellar systems. Observations and theory of pulsars, quasars, X-ray sources, gamma ray sources, neutron stars and black holes.
Astr. 171 Readings (1-3) fall-spring. For nonscience major to study an area of astronomy more deeply than at the introductory level. Individual supervision.
Astr 211. Stellar Structure and Evolution (3) fall, even numbered years – Physical processes in stellar interiors. Theory of stellar evolution and interpretation of observations. Binary star evolution. Theory of novae and supernovae.
Astr 221. Stellar Atmospheres (3) fall, odd numbered years – Observation and theory of stellar spectra. Model atmospheres and chemical abundances. Extended atmospheres, stellar winds and mass loss. Theory of gaseous nebulae.

Astr 232. High Energy Astrophysics (3) spring, odd numbered years – Observation and theory of X-ray and gamma-ray sources, quasars, pulsars, radio galaxies, neutron stars, black holes. Results from ultraviolet, X-ray and gamma-ray satellites.
Astr 242. Relativity and Cosmology (3) spring, even numbered years – Special and general relativity. Schwarzschild and Kerr black holes, Supermassive stars. Relativistic theories of the origin and evolution of the universe.
Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering major who desire to study an active area of research in astrophysics.
Minor in astronomy listed under mathematics requiring: PHY 11, Math 21, Math 22, Astr 2, Astr 211 or 221, and Astr 232 or 242.

1986-1987 Catalog – Special Collections
Instructors: George E. McCluskey, A.B., M.S., Ph.D., Professor of Astronomy and Mathematics.
Courses: Under Astronomy, offered in the Department of Mathematics:
Astr. 1 The Solar System (3) fall – A survey of our knowledge of the solar system. Apollo lunar missions. Mariner missions to Mercury, Venus, and Mars. Viking missions to Mars, Missions to Jupiter and Saturn.
Astr 2. Stellar Astronomy (3) spring – Survey of our knowledge of stars and stellar systems. Observations and theory of pulsars, quasars, X-ray sources, gamma ray sources, neutron stars and black holes.
Astr. 171 Readings (1-3) fall-spring. For nonscience major to study an area of astronomy more deeply than at the introductory level. Individual supervision.
Astr 211. Stellar Structure and Evolution (3) fall, even numbered years – Physical processes in stellar interiors. Theory of stellar evolution and interpretation of observations. Binary star evolution. Theory of novae and supernovae.
Astr 221. Stellar Atmospheres (3) fall, odd numbered years – Observation and theory of stellar spectra. Model atmospheres and chemical abundances. Extended atmospheres, stellar winds and mass loss. Theory of gaseous nebulae.
Astr 232. High Energy Astrophysics (3) spring, odd numbered years – Observation and theory of X-ray and gamma-ray sources, quasars, pulsars, radio galaxies, neutron stars, black holes. Results from ultraviolet, X-ray and gamma-ray satellites.
Astr 242. Relativity and Cosmology (3) spring, even numbered years – Special and general relativity. Schwarzschild and Kerr black holes, Supermassive stars. Relativistic theories of the origin and evolution of the universe.
Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering major who desire to study an active area of research in astrophysics.
Minor in astronomy listed under mathematics requiring: PHY 11, Math 21, Math 22, Astr 2, Astr 211 or 221, and Astr 232 or 242.
Sayre Observatory – New computer store.

1987-1988 Catalog – Special Collections
Instructors: George E. McCluskey, A.B., M.S., Ph.D., Professor of Astronomy and Mathematics.
Courses: Under Astronomy, offered in the Department of Mathematics:

Astr. 1 The Solar System (3) fall – A survey of our knowledge of the solar system. Apollo lunar missions. Mariner missions to Mercury, Venus, and Mars. Viking missions to Mars, Missions to Jupiter and Saturn.
Astr 2. Stellar Astronomy (3) spring – Survey of our knowledge of stars and stellar systems. Observations and theory of pulsars, quasars, X-ray sources, gamma ray sources, neutron stars and black holes.
Astr. 171 Readings (1-3) fall-spring. For nonscience major to study an area of astronomy more deeply than at the introductory level. Individual supervision.
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Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering major who desire to study an active area of research in astrophysics.
Minor in astronomy listed under mathematics requiring: PHY 21, Astr 2, Astr 211 or 221, and Astr 232 or 242.
Sayre Observatory - Computer store location.

1988-1989 Catalog – Special Collections
Instructors: George E. McCluskey, A.B., M.S., Ph.D., Professor of Astronomy and Mathematics.
Courses: Under Astronomy, offered in the Department of Mathematics:
Astr. 1 The Solar System (3) fall – A survey of our knowledge of the solar system. Apollo lunar missions. Mariner missions to Mercury, Venus, and Mars. Viking missions to Mars, Missions to Jupiter and Saturn.
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Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering major who desire to study an active area of research in astrophysics.
Minor in astronomy listed under mathematics requiring: PHY 21, Astr 2, Astr 211 or 221, and Astr 232 or 242.
Sayre Observatory “Once housed a telescope”.

1990’s

1990-1991 Catalog – Special Collections

Instructors: George E. McCluskey, A.B., M.S., Ph.D., Professor of Astronomy and Mathematics.
Courses: Under Astronomy, offered in the Department of Mathematics:
Astr. 1 The Solar System (3) fall – A survey of our knowledge of the solar system. Apollo lunar missions. Mariner missions to Mercury, Venus, and Mars. Viking missions to Mars, Missions to Jupiter and Saturn.
Astr 2. Stellar Astronomy (3) spring – Survey of our knowledge of stars and stellar systems. Observations and theory of pulsars, quasars, X-ray sources, gamma ray sources, neutron stars and black holes.
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Astr 342. Relativity and Cosmology (3) spring, even numbered years – Special and general relativity. Schwarzschild and Kerr black holes, Supermassive stars. Relativistic theories of the origin and evolution of the universe.
Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering major who desire to study an active area of research in astrophysics. Individual Supervision.
Minor in astronomy listed under mathematics requiring: PHY 21, Astr 2, Astr 211 or 221, and Astr 232 or 242.
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1991-1992 Catalog – Special Collections
Instructors: George E. McCluskey, A.B., M.S., Ph.D., Professor of Astronomy and Mathematics.
Courses: Under Astronomy, offered in the Department of Mathematics:
Astr. 1 The Solar System (3) fall – A survey of our knowledge of the solar system. Apollo lunar missions. Mariner missions to Mercury, Venus, and Mars. Viking missions to Mars, Missions to Jupiter and Saturn.
Astr 2. Stellar Astronomy (3) spring – Survey of our knowledge of stars and stellar systems. Observations and theory of pulsars, quasars, X-ray sources, gamma ray sources, neutron stars and black holes.
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Astr 221. Stellar Atmospheres (3) fall, odd numbered years – Observation and theory of stellar spectra. Model atmospheres and chemical abundances. Extended atmospheres, stellar winds and mass loss. Theory of gaseous nebulae.
Astr 332. High Energy Astrophysics (3) spring, odd numbered years – Observation and theory of X-ray and gamma-ray sources, quasars, pulsars, radio galaxies, neutron stars, black holes. Results from ultraviolet, X-ray and gamma-ray satellites.
Astr 342. Relativity and Cosmology (3) spring, even numbered years – Special and general relativity. Schwarzschild and Kerr black holes, Supermassive stars. Relativistic theories of the origin and evolution of the universe.
Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering major who desire to study an active area of research in astrophysics. Individual Supervision
Minor in astronomy listed under mathematics requiring: PHY 21, Astr 2, Astr 211 or 221, and Astr 232 or 242.
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1992-1993 Catalog – Special Collections
Instructors: George E. McCluskey, A.B., M.S., Ph.D., Professor of Astronomy and Mathematics.
Courses: Under Astronomy, offered in the Department of Mathematics:
Astr. 1 The Solar System (3) fall – A survey of our knowledge of the solar system. Apollo lunar missions. Mariner missions to Mercury, Venus, and Mars. Viking missions to Mars, Missions to Jupiter and Saturn.
Astr 2. Stellar Astronomy (3) spring – Survey of our knowledge of stars and stellar systems. Observations and theory of pulsars, quasars, X-ray sources, gamma ray sources, neutron stars and black holes.
Astr. 171 Readings (1-3) fall-spring. For nonscience major to study an area of astronomy more deeply than at the introductory level. Individual supervision.
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Astr 332. High Energy Astrophysics (3) spring, odd numbered years – Observation and theory of X-ray and gamma-ray sources, quasars, pulsars, radio galaxies, neutron stars, black holes. Results from ultraviolet, X-ray and gamma-ray satellites.
Astr 342. Relativity and Cosmology (3) spring, even numbered years – Special and general relativity. Schwarzschild and Kerr black holes, Supermassive stars. Relativistic theories of the origin and evolution of the universe.
Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering major who desire to study an active area of research in astrophysics. Individual Supervision.
Minor in astronomy listed under mathematics requiring: PHY 21, Astr 2, Astr 211 or 221, and Astr 232 or 242.
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1993-1994 Catalog – Special Collections

Instructors: George E. McCluskey, A.B., M.S., Ph.D., Professor of Astronomy and Mathematics.
Courses: Under Astronomy, offered in the Department of Mathematics:
Astr. 1 The Solar System (3) fall – A survey of our knowledge of the solar system. Apollo lunar missions. Mariner missions to Mercury, Venus, and Mars. Viking missions to Mars, Missions to Jupiter and Saturn.
Astr 2. Stellar Astronomy (3) spring – Survey of our knowledge of stars and stellar systems. Observations and theory of pulsars, quasars, X-ray sources, gamma ray sources, neutron stars and black holes.
Astr. 171 Readings (1-3) fall-spring. For nonscience major to study an area of astronomy more deeply than at the introductory level. Individual supervision.
Astr 211. Stellar Structure and Evolution (3) fall, even numbered years – Physical processes in stellar interiors. Theory of stellar evolution and interpretation of observations. Binary star evolution. Theory of novae and supernovae.
Astr 221. Stellar Atmospheres (3) fall, odd numbered years – Observation and theory of stellar spectra. Model atmospheres and chemical abundances. Extended atmospheres, stellar winds and mass loss. Theory of gaseous nebulae.
Astr 332. High Energy Astrophysics (3) spring, odd numbered years – Observation and theory of X-ray and gamma-ray sources, quasars, pulsars, radio galaxies, neutron stars, black holes. Results from ultraviolet, X-ray and gamma-ray satellites.
Astr 342. Relativity and Cosmology (3) spring, even numbered years – Special and general relativity. Schwarzschild and Kerr black holes, Supermassive stars. Relativistic theories of the origin and evolution of the universe.
Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering major who desire to study an active area of research in astrophysics. Individual Supervision.
Minor in astronomy listed under mathematics requiring: PHY 21, Astr 2, Astr 211 or 221, and Astr 232 or 242.
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1994-1995 Catalog – Special Collections
Instructors: George E. McCluskey, A.B., M.S., Ph.D., Professor of Astronomy and Mathematics.
Courses: Under Astronomy, offered in the Department of Mathematics:
Astr. 1 The Solar System (3) fall – A survey of our knowledge of the solar system. Apollo lunar missions. Mariner missions to Mercury, Venus, and Mars. Viking missions to Mars, Missions to Jupiter and Saturn.
Astr 2. Stellar Astronomy (3) spring – Survey of our knowledge of stars and stellar systems. Observations and theory of pulsars, quasars, X-ray sources, gamma ray sources, neutron stars and black holes.
Astr. 171 Readings (1-3) fall-spring. For nonscience major to study an area of astronomy more deeply than at the introductory level. Individual supervision.
Astr 211. Stellar Structure and Evolution (3) fall, even numbered years – Physical processes in stellar interiors. Theory of stellar evolution and interpretation of observations. Binary star evolution. Theory of novae and supernovae.

Astr 221. Stellar Atmospheres (3) fall, odd numbered years – Observation and theory of stellar spectra. Model atmospheres and chemical abundances. Extended atmospheres, stellar winds and mass loss. Theory of gaseous nebulae.
Astr 332. High Energy Astrophysics (3) spring, odd numbered years – Observation and theory of X-ray and gamma-ray sources, quasars, pulsars, radio galaxies, neutron stars, black holes. Results from ultraviolet, X-ray and gamma-ray satellites.
Astr 342. Relativity and Cosmology (3) spring, even numbered years – Special and general relativity. Schwarzschild and Kerr black holes, Supermassive stars. Relativistic theories of the origin and evolution of the universe.
Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering major who desire to study an active area of research in astrophysics. Individual Supervision.
Minor in astronomy listed under mathematics requiring: PHY 21, Astr 2, Astr 211 or 221, and Astr 332 or 342.
Sayre Observatory "Once housed a telescope" now houses the graduate student council.

1995-1996 Catalog – Special Collections
Instructors: George E. McCluskey, A.B., M.S., Ph.D., Professor of Astronomy and Mathematics.
Courses: Under Astronomy, offered in the Department of Mathematics:
Astr. 1 The Solar System (3) fall – Apparent motions of celestial bodies on the celestial sphere; rotation and revolution of planets and satellites; physical properties of the planets, their satellites, asteroids, comets and meteoroids; origin of the solar system, the Sun.
Astr 2. Stellar Astronomy (3) spring – Apparent brightness, colors, spectra, and absolute properties of stars; the birth, evolution and death of single and binary stars; the interstellar medium; the Galaxy; galaxies and clusters of galaxies; the nature of the universe.
Astr. 171 Readings (1-3) fall-spring. For nonscience major to study an area of astronomy more deeply than at the introductory level. Individual supervision.
Astr 211. Stellar Structure and Evolution (3) fall, even numbered years – Physical processes in stellar interiors. Theory of stellar evolution and interpretation of observations. Binary star evolution. Theory of novae and supernovae.
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Astr 342. Relativity and Cosmology (3) spring, even numbered years – Special and general relativity. Schwarzschild and Kerr black holes, Supermassive stars. Relativistic theories of the origin and evolution of the universe.
Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering major who desire to study an active area of research in astrophysics. Individual Supervision.
Minor in astronomy listed under mathematics requiring: PHY 21, Astr 2, Astr 211 or 221, and Astr 332 or 342.
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1996-1997 Catalog – Special Collections
Instructors: George E. McCluskey, A.B., M.S., Ph.D., Professor of Astronomy and Mathematics.
Courses: Under Astronomy, offered in the Department of Mathematics:
Astr. 1 The Solar System (3) fall – Apparent motions of celestial bodies on the celestial sphere; rotation and revolution of planets and satellites; physical properties of the planets, their satellites, asteroids, comets and meteoroids; origin of the solar system, the Sun.
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Astr 332. (Phy 332) High Energy Astrophysics (3) spring, odd numbered years – Observation and theory of X-ray and gamma-ray sources, quasars, pulsars, radio galaxies, neutron stars, black holes. Results from ultraviolet, X-ray and gamma-ray satellites.
Astr 342. (Phy 342) Relativity and Cosmology (3) spring, even numbered years – Special and general relativity. Schwarzschild and Kerr black holes, Supermassive stars. Relativistic theories of the origin and evolution of the universe.
Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering major who desire to study an active area of research in astrophysics. Individual Supervision.
Minor in astronomy listed under mathematics requiring: PHY 21, Astr 2, Astr 211 or 221, and Astr 332 or 342.
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1997-1998 Catalog – Special Collections
Instructors: George E. McCluskey Jr., A.B., M.S., Ph.D., Professor of Astronomy and Mathematics.
Courses: Under Astronomy, offered in the Department of Mathematics:
Astr. 1 The Solar System (3) fall – Apparent motions of celestial bodies on the celestial sphere; rotation and revolution of planets and satellites; physical properties of the planets, their satellites, asteroids, comets and meteoroids; origin of the solar system, the Sun.
Astr 2. Stellar Astronomy (3) spring – Apparent brightness, colors, spectra, and absolute properties of stars; the birth, evolution and death of single and binary stars; the interstellar medium; the Galaxy; galaxies and clusters of galaxies; the nature of the universe.
Astr. 171 Readings (1-3) fall-spring. For nonscience major to study an area of astronomy more deeply than at the introductory level. Individual supervision.

Astr 211. Stellar Structure and Evolution (3) fall, even numbered years – Physical processes in stellar interiors. Theory of stellar evolution and interpretation of observations. Binary star evolution. Theory of novae and supernovae.
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Astr 342. (Phy 342) Relativity and Cosmology (3) spring, even numbered years – Special and general relativity. Schwarzschild and Kerr black holes, Supermassive stars. Relativistic theories of the origin and evolution of the universe.
Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering major who desire to study an active area of research in astrophysics. Individual Supervision.
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1998-1999 Catalog – Special Collections
Instructors: George E. McCluskey Jr., A.B., M.S., Ph.D., Professor of Astronomy and Mathematics, Chairperson of Mathematics.
Courses: Under Astronomy, offered in the Department of Mathematics:
Astr. 1 The Solar System (3) fall – Apparent motions of celestial bodies on the celestial sphere; rotation and revolution of planets and satellites; physical properties of the planets, their satellites, asteroids, comets and meteoroids; origin of the solar system, the Sun.
Astr 2. Stellar Astronomy (3) spring – Apparent brightness, colors, spectra, and absolute properties of stars; the birth, evolution and death of single and binary stars; the interstellar medium; the Galaxy; galaxies and clusters of galaxies; the nature of the universe.
Astr. 171 Readings (1-3) fall-spring. For nonscience major to study an area of astronomy more deeply than at the introductory level. Individual supervision.
Astr 211. Stellar Structure and Evolution (3) fall, even numbered years – Physical processes in stellar interiors. Theory of stellar evolution and interpretation of observations. Binary star evolution. Theory of novae and supernovae.
Astr 221. Stellar Atmospheres (3) fall, odd numbered years – Observation and theory of stellar spectra. Model atmospheres and chemical abundances. Extended atmospheres, stellar winds and mass loss. Theory of gaseous nebulae.
Astr 332. (Phy 332) High Energy Astrophysics (3) spring, odd numbered years – Observation and theory of X-ray and gamma-ray sources, quasars, pulsars, radio galaxies, neutron stars, black holes. Results from ultraviolet, X-ray and gamma-ray satellites.
Astr 342. (Phy 342) Relativity and Cosmology (3) spring, even numbered years – Special and general relativity. Schwarzschild and Kerr black holes, Supermassive stars. Relativistic theories of the origin and evolution of the universe.
Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering major who desire to study an active area of research in astrophysics. Individual Supervision.

Minor in astronomy listed under mathematics requiring: PHY 21, Astr 2, Astr 211 or 221, and Astr 332 or 342.
Sayre Observatory "Once housed a telescope" now houses the graduate student council.

1999-2000 Catalog – Special Collections
Instructors: George E. McCluskey Jr., A.B., M.S., Ph.D., Professor of Astronomy and Mathematics, Chair of Mathematics.
Courses: Under Astronomy, offered in the Department of Mathematics:
Astr. 1 The Solar System (3) fall – Apparent motions of celestial bodies on the celestial sphere; rotation and revolution of planets and satellites; physical properties of the planets, their satellites, asteroids, comets and meteoroids; origin of the solar system, the Sun.
Astr 2. Stellar Astronomy (3) spring – Apparent brightness, colors, spectra, and absolute properties of stars; the birth, evolution and death of single and binary stars; the interstellar medium; the Galaxy; galaxies and clusters of galaxies; the nature of the universe.
Astr. 171 Readings (1-3) fall-spring. For nonscience major to study an area of astronomy more deeply than at the introductory level. Individual supervision.
Astr 211. Stellar Structure and Evolution (3) fall, even numbered years – Physical processes in stellar interiors. Theory of stellar evolution and interpretation of observations. Binary star evolution. Theory of novae and supernovae.
Astr 221. Stellar Atmospheres (3) fall, odd numbered years – Observation and theory of stellar spectra. Model atmospheres and chemical abundances. Extended atmospheres, stellar winds and mass loss. Theory of gaseous nebulae.
Astr 332. (Phy 332) High Energy Astrophysics (3) spring, odd numbered years – Observation and theory of X-ray and gamma-ray sources, quasars, pulsars, radio galaxies, neutron stars, black holes. Results from ultraviolet, X-ray and gamma-ray satellites.
Astr 342. (Phy 342) Relativity and Cosmology (3) spring, even numbered years – Special and general relativity. Schwarzschild and Kerr black holes, Supermassive stars. Relativistic theories of the origin and evolution of the universe.
Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering major who desire to study an active area of research in astrophysics. Individual Supervision
Minor in astronomy listed under mathematics requiring: PHY 21, Astr 2, Astr 211 or 221, and Astr 332 or 342, plus four courses slected from among the following; any Astronomy course except Astr 1, Csc 17, Math 208, 231, Phy 31, 213, 215, 348, 362.
Sayre Observatory "Once housed a telescope" now houses the graduate student council.

2000's

2000-2001 Catalog – Special Collections ****** add full programs?***
Instructors: George E. McCluskey Jr., A.B., M.S., Ph.D., Professor of Astronomy and Mathematics, Chair of Mathematics, head of the division of astronomy, Gary G. DeLeo, B.S., M.S., Ph.D. Professor of Physics.
Courses: Under Astronomy, offered in the Department of Mathematics:
Astr. 7 (Phy 7) Introduction to Astronomy (3) fall – Introduction to planetary, stellar, galactic, and extragalactic astronomy. An examination of the surface characteristics, atmospheres, and motions of planets and other bodies in our solar systems. Properties of

the sun, stars, and galaxies, including the birth and death of stars, stellar explosions, and the formation of stellar remnants such as white dwarfs, neutron stars, pulsars, and black holes. Quasars, cosmology, and the evolution of the universe.
Astr 8. (Phy 8) Introduction to Astronomy Laboratory (1) fall, laboratory to accompany Astr/Phy 7.
Astr. 105 (Phy 105, EES 105) Planetary Astronomy (4) fall. Structure and dynamics of planetary interiors, surfaces, and atmospheres. Models for the formation of the solar system and planetary evolution. Internal structure, surface topology, and composition of planets and other bodies in our solar system. Comparative study of planetary atmospheres. Organic materials in the solar system. Properties of the interplanetary medium, including dust and meteoroids. Orbital dynamics. Extrasolar planetary systems.
Astr 110 (Phy 110) Methods of Observational Astronomy (1) spring. Techniques of astronomical observation, data reduction, and analysis. Photometry, spectroscopy, CCD imaging, and interferometry. Computational analysis. Examination of ground based and spacecraft instrumentation, and data transmission, reduction, and analysis.
Astr 201 (Phy 201) Modern Astrophysics I (4) fall. Physics of stellar atmospheres and interiors, and the formation, evolution, and death of stars. Variable stars. The evolution of binary star systems. Novae, supernovae, white dwarfs, neutron stars, pulsars, and black holes. Stellar spectra, chemical compositions, and thermodynamics processes. Thermonuclear reactions. Interstellar medium.
Astr 202 (Phy 202) Modern Astrophysics II (4) spring. The Milky Way Galaxy, galactic morphology, and evolutionary processes. Active galaxies and quasars. Observed properties of the universe. Relativistic cosmology, and the origin, evolution and fate of the universe. Elements of General Relativity and associated phenomena.
Astr 332 (Phy 332 High Energy Astrophysics (3) spring, odd-numbered years. Observation and theory of X-ray and gamma ray sources, quasars, pulsars, radio galaxies, neutron stars, black holes. Results from ultraviolet, X-ray and gamma ray satellites.
Astr 342 (Phy 342) Relativity and Cosmology (3) spring, even-numbered years. Special and general relativity. Schwarzschild and Kerr black holes. Supermassive stars. Theories of the origin and evolution of the universe.
Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering majors who desire to study an active area of research in astrophysics. Individual supervision.
Minor in astronomy listed under mathematics requiring: PHY 21, Astr 105, Astr 201 and 202, and one Astr course at 300 level, plus two courses (minimum of 6 credit hours) selected from among the following; any Astronomy course except Astr 7, 8, Csc 17, Math 208, 231, Phy 31, 213, 215, 348, 362
Sayre Observatory “Once housed a telescope” now houses the graduate student council.

2001-2002 Catalog – Special Collections ****** add full programs?***
Instructors: George E. McCluskey Jr., A.B., M.S., Ph.D., Professor of Astronomy and Mathematics, Chair of Mathematics, head of the division of astronomy, Gary G. DeLeo, B.S., M.S., Ph.D. Professor of Physics.
Majors in Astronomy and Astrophysics listed. B.A. in Astronomy and B.S. in Astrophysics.
Courses: Under Astronomy, offered in the department of Physics:

Astr. 7 (Phy 7) Introduction to Astronomy (3) fall – Introduction to planetary, stellar, galactic, and extragalactic astronomy. An examination of the surface characteristics, atmospheres, and motions of planets and other bodies in our solar systems. Properties of the sun, stars, and galaxies, including the birth and death of stars, stellar explosions, and the formation of stellar remnants such as white dwarfs, neutron stars, pulsars, and black holes. Quasars, cosmology, and the evolution of the universe.
Astr 8. (Phy 8) Introduction to Astronomy Laboratory (1) fall, laboratory to accompany Astr/Phy 7.
Astr. 105 (Phy 105, EES 105) Planetary Astronomy (4) fall. Structure and dynamics of planetary interiors, surfaces, and atmospheres. Models for the formation of the solar system and planetary evolution. Internal structure, surface topology, and composition of planets and other bodies in our solar system. Comparative study of planetary atmospheres. Organic materials in the solar system. Properties of the interplanetary medium, including dust and meteoroids. Orbital dynamics. Extrasolar planetary systems.
Astr 110 (Phy 110) Methods of Observational Astronomy (1) spring. Techniques of astronomical observation, data reduction, and analysis. Photometry, spectroscopy, CCD imaging, and interferometry. Computational analysis. Examination of ground based and spacecraft instrumentation, and data transmission, reduction, and analysis.
For advanced Undergraduates and Graduate Students
Astr 201 (Phy 201) Modern Astrophysics I (4) fall. Physics of stellar atmospheres and interiors, and the formation, evolution, and death of stars. Variable stars. The evolution of binary star systems. Novae, supernovae, white dwarfs, neutron stars, pulsars, and black holes. Stellar spectra, chemical compositions, and thermodynamics processes. Thermonuclear reactions. Interstellar medium.
Astr 202 (Phy 202) Modern Astrophysics II (4) spring. The Milky Way Galaxy, galactic morphology, and evolutionary processes. Active galaxies and quasars. Observed properties of the universe. Relativistic cosmology, and the origin, evolution and fate of the universe. Elements of General Relativity and associated phenomena.
Astr 332 (Phy 332 High Energy Astrophysics (3) spring, odd-numbered years. Observation and theory of X-ray and gamma ray sources, quasars, pulsars, radio galaxies, neutron stars, black holes. Results from ultraviolet, X-ray and gamma ray satellites.
Astr 342 (Phy 342) Relativity and Cosmology (3) spring, even-numbered years. Special and general relativity. Schwarzschild and Kerr black holes. Supermassive stars. Theories of the origin and evolution of the universe.
Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering majors who desire to study an active area of research in astrophysics. Individual supervision.
Minor in astronomy listed under mathematics requiring: PHY 21, Astr 105, Astr 201 and 202, and one Astr course at 300 level, plus two courses (minimum of 6 credit hours) selected from among the following; any Astronomy course except Astr 7, 8, Csc 17, Math 208, 231, Phy 31, 213, 215, 348, 362
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2002-2003 Catalog – Special Collections ****** add full programs?***
Instructors: George E. McCluskey Jr., A.B., M.S., Ph.D., Professor of Astronomy and Mathematics, Gary G. DeLeo, B.S., M.S., Ph.D. Professor of Physics.

Majors in Astronomy and Astrophysics listed. B.A. in Astronomy and B.S. in Astrophysics.
Courses: Under Astronomy, offered in the department of Physics:
Astr. 7 (Phy 7) Introduction to Astronomy (3) fall – Introduction to planetary, stellar, galactic, and extragalactic astronomy. AN examination of the surface characteristics, atmospheres, and motions of planets and other bodies in our solar systems. Properties of the sun, stars, and galaxies, including the birth and death of stars, stellar explosions, and the formation of stellar remnants such as white dwarfs, neutron stars, pulsars, and black holes. Quasars, cosmology, and the evolution of the universe.
Astr 8. (Phy 8) Introduction to Astronomy Laboratory (1) fall, laboratory to accompany Astr/Phy 7.
Astr. 105 (Phy 105, EES 105) Planetary Astronomy (4) fall. Structure and dynamics of planetary interiors, surfaces, and atmospheres. Models for the formation of the solar system and planetary evolution. Internal structure, surface topology, and composition of planets and other bodies in our solar system. Comparative study of planetary atmospheres. Organic materials in the solar system. Properties of the interplanetary medium, including dust and meteoroids. Orbital dynamics. Extrasolar planetary systems.
Astr 110 (Phy 110) Methods of Observational Astronomy (1) spring. Techniques of astronomical observation, data reduction, and analysis. Photometry, spectroscopy, CCD imaging, and interferometry. Computational analysis. Examination of ground based and spacecraft instrumentation, and data transmission, reduction, and analysis.
For advanced Undergraduates and Graduate Students
Astr 201 (Phy 201) Modern Astrophysics I (4) fall. Physics of stellar atmospheres and interiors, and the formation, evolution, and death of stars. Variable stars. The evolution of binary star systems. Novae, supernovae, white dwarfs, neutron stars, pulsars, and black holes. Stellar spectra, chemical compositions, and thermodynamics processes. Thermonuclear reactions. Interstellar medium.
Astr 202 (Phy 202) Modern Astrophysics II (4) spring. The Milky Way Galaxy, galactic morphology, and evolutionary processes. Active galaxies and quasars. Observed properties of the universe. Relativistic cosmology, and the origin, evolution and fate of the universe. Elements of General Relativity and associated phenomena.
Astr 332 (Phy 332 High Energy Astrophysics (3) spring, odd-numbered years. Observation and theory of X-ray and gamma ray sources, quasars, pulsars, radio galaxies, neutron stars, black holes. Results from ultraviolet, X-ray and gamma ray satellites.
Astr 342 (Phy 342) Relativity and Cosmology (3) spring, even-numbered years. Special and general relativity. Schwarzschild and Kerr black holes. Supermassive stars. Theories of the origin and evolution of the universe.
Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering majors who desire to study an active area of research in astrophysics. Individual supervision.
Minor in astronomy listed under mathematics requiring: PHY 21, Astr 105, Astr 201 and 202, and one Astr course at 300 level, plus two courses (minimum of 6 credit hours) selected from among the following; any Astronomy course except Astr 7, 8, Csc 17, Math 208, 231, Phy 31, 213, 215, 348, 362
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2003-2004 Catalog – Special Collections ****** add full programs?***

Instructors: George E. McCluskey Jr., A.B., M.S., Ph.D., Professor of Astronomy and Mathematics, Gary G. DeLeo, B.S., M.S., Ph.D. Professor of Physics.
Majors in Astronomy and Astrophysics listed. B.A. in Astronomy and B.S. in Astrophysics.
Courses: Under Astronomy, offered in the department of Physics:
Astr. 7 (Phy 7) Introduction to Astronomy (3) fall – Introduction to planetary, stellar, galactic, and extragalactic astronomy. An examination of the surface characteristics, atmospheres, and motions of planets and other bodies in our solar systems. Properties of the sun, stars, and galaxies, including the birth and death of stars, stellar explosions, and the formation of stellar remnants such as white dwarfs, neutron stars, pulsars, and black holes. Quasars, cosmology, and the evolution of the universe.
Astr 8. (Phy 8) Introduction to Astronomy Laboratory (1) fall, laboratory to accompany Astr/Phy 7.
Astr. 105 (Phy 105, EES 105) Planetary Astronomy (4) fall. Structure and dynamics of planetary interiors, surfaces, and atmospheres. Models for the formation of the solar system and planetary evolution. Internal structure, surface topology, and composition of planets and other bodies in our solar system. Comparative study of planetary atmospheres. Organic materials in the solar system. Properties of the interplanetary medium, including dust and meteoroids. Orbital dynamics. Extrasolar planetary systems.
Astr 110 (Phy 110) Methods of Observational Astronomy (1) spring. Techniques of astronomical observation, data reduction, and analysis. Photometry, spectroscopy, CCD imaging, and interferometry. Computational analysis. Examination of ground based and spacecraft instrumentation, and data transmission, reduction, and analysis.
For advanced Undergraduates and Graduate Students
Astr 201 (Phy 201) Modern Astrophysics I (4) fall. Physics of stellar atmospheres and interiors, and the formation, evolution, and death of stars. Variable stars. The evolution of binary star systems. Novae, supernovae, white dwarfs, neutron stars, pulsars, and black holes. Stellar spectra, chemical compositions, and thermodynamics processes. Thermonuclear reactions. Interstellar medium.
Astr 202 (Phy 202) Modern Astrophysics II (4) spring. The Milky Way Galaxy, galactic morphology, and evolutionary processes. Active galaxies and quasars. Observed properties of the universe. Relativistic cosmology, and the origin, evolution and fate of the universe. Elements of General Relativity and associated phenomena.
Astr 332 (Phy 332 High Energy Astrophysics (3) spring, odd-numbered years. Observation and theory of X-ray and gamma ray sources, quasars, pulsars, radio galaxies, neutron stars, black holes. Results from ultraviolet, X-ray and gamma ray satellites.
Astr 342 (Phy 342) Relativity and Cosmology (3) spring, even-numbered years. Special and general relativity. Schwarzschild and Kerr black holes. Supermassive stars. Theories of the origin and evolution of the universe.
Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering majors who desire to study an active area of research in astrophysics. Individual supervision.
Minor in astronomy listed under mathematics requiring: PHY 21, Astr 105, Astr 201 and 202, and one Astr course at 300 level, plus two courses (minimum of 6 credit hours) selected from among the following; any Astronomy course except Astr 7, 8, Csc 17, Math 208, 231, Phy 31, 213, 215, 348, 362.
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2004-2005 Catalog – Special Collections ****** add full programs?***
Instructors: George E. McCluskey Jr., A.B., M.S., Ph.D., Professor of Physics, Gary G. DeLeo, B.S., M.S., Ph.D. Professor of Physics.
Majors in Astronomy and Astrophysics listed. B.A. in Astronomy and B.S. in Astrophysics.
Courses: Under Astronomy, offered in the department of Physics:
Astr. 7 (Phy 7) Introduction to Astronomy (3) fall – Introduction to planetary, stellar, galactic, and extragalactic astronomy. AN examination of the surface characteristics, atmospheres, and motions of planets and other bodies in our solar systems. Properties of the sun, stars, and galaxies, including the birth and death of stars, stellar explosions, and the formation of stellar remnants such as white dwarfs, neutron stars, pulsars, and black holes. Quasars, cosmology, and the evolution of the universe.
Astr 8. (Phy 8) Introduction to Astronomy Laboratory (1) fall, laboratory to accompany Astr/Phy 7.
Astr. 105 (Phy 105, EES 105) Planetary Astronomy (4) fall. Structure and dynamics of planetary interiors, surfaces, and atmospheres. Models for the formation of the solar system and planetary evolution. Internal structure, surface topology, and composition of planets and other bodies in our solar system. Comparative study of planetary atmospheres. Organic materials in the solar system. Properties of the interplanetary medium, including dust and meteoroids. Orbital dynamics. Extrasolar planetary systems.
Astr 110 (Phy 110) Methods of Observational Astronomy (1) spring. Techniques of astronomical observation, data reduction, and analysis. Photometry, spectroscopy, CCD imaging, and interferometry. Computational analysis. Examination of ground based and spacecraft instrumentation, and data transmission, reduction, and analysis.
For advanced Undergraduates and Graduate Students
Astr 201 (Phy 201) Modern Astrophysics I (4) fall. Physics of stellar atmospheres and interiors, and the formation, evolution, and death of stars. Variable stars. The evolution of binary star systems. Novae, supernovae, white dwarfs, neutron stars, pulsars, and black holes. Stellar spectra, chemical compositions, and thermodynamics processes. Thermonuclear reactions. Interstellar medium.
Astr 202 (Phy 202) Modern Astrophysics II (4) spring. The Milky Way Galaxy, galactic morphology, and evolutionary processes. Active galaxies and quasars. Observed properties of the universe. Relativistic cosmology, and the origin, evolution and fate of the universe. Elements of General Relativity and associated phenomena.
Astr 332 (Phy 332 High Energy Astrophysics (3) spring, odd-numbered years. Observation and theory of X-ray and gamma ray sources, quasars, pulsars, radio galaxies, neutron stars, black holes. Results from ultraviolet, X-ray and gamma ray satellites.
Astr 342 (Phy 342) Relativity and Cosmology (3) spring, even-numbered years. Special and general relativity. Schwarzschild and Kerr black holes. Supermassive stars. Theories of the origin and evolution of the universe.
Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering majors who desire to study an active area of research in astrophysics. Individual supervision.
Minor in astronomy listed under mathematics requiring: PHY 21, Astr 105, Astr 201 and 202, and one Astr course at 300 level, plus two courses (minimum of 6 credit hours)

selected from among the following; any Astronomy course except Astr 7, 8, Csc 17, Math 208, 231, Phy 31, 213, 215, 348, 362.
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2005-2006 Catalog – Special Collections
Instructors: George E. McCluskey Jr., A.B., M.S., Ph.D., Professor of Physics, Gary G. DeLeo, B.S., M.S., Ph.D. Professor of Physics.
Majors in Astronomy and Astrophysics listed. B.A. in Astronomy and B.S. in Astrophysics.
Courses: Under Astronomy, offered in the department of Physics:
Astr. 7 (Phy 7) Introduction to Astronomy (3) fall – Introduction to planetary, stellar, galactic, and extragalactic astronomy. AN examination of the surface characteristics, atmospheres, and motions of planets and other bodies in our solar systems. Properties of the sun, stars, and galaxies, including the birth and death of stars, stellar explosions, and the formation of stellar remnants such as white dwarfs, neutron stars, pulsars, and black holes. Quasars, cosmology, and the evolution of the universe.
Astr 8. (Phy 8) Introduction to Astronomy Laboratory (1) fall, laboratory to accompany Astr/Phy 7.
Astr. 105 (Phy 105, EES 105) Planetary Astronomy (4) fall. Structure and dynamics of planetary interiors, surfaces, and atmospheres. Models for the formation of the solar system and planetary evolution. Internal structure, surface topology, and composition of planets and other bodies in our solar system. Comparative study of planetary atmospheres. Organic materials in the solar system. Properties of the interplanetary medium, including dust and meteoroids. Orbital dynamics. Extrasolar planetary systems.
Astr 110 (Phy 110) Methods of Observational Astronomy (1) spring. Techniques of astronomical observation, data reduction, and analysis. Photometry, spectroscopy, CCD imaging, and interferometry. Computational analysis. Examination of ground based and spacecraft instrumentation, and data transmission, reduction, and analysis.
For advanced Undergraduates and Graduate Students
Astr 201 (Phy 201) Modern Astrophysics I (4) fall. Physics of stellar atmospheres and interiors, and the formation, evolution, and death of stars. Variable stars. The evolution of binary star systems. Novae, supernovae, white dwarfs, neutron stars, pulsars, and black holes. Stellar spectra, chemical compositions, and thermodynamics processes. Thermonuclear reactions. Interstellar medium.
Astr 202 (Phy 202) Modern Astrophysics II (4) spring. The Milky Way Galaxy, galactic morphology, and evolutionary processes. Active galaxies and quasars. Observed properties of the universe. Relativistic cosmology, and the origin, evolution and fate of the universe. Elements of General Relativity and associated phenomena.
Astr 332 (Phy 332 High Energy Astrophysics (3) spring, odd-numbered years. Observation and theory of X-ray and gamma ray sources, quasars, pulsars, radio galaxies, neutron stars, black holes. Results from ultraviolet, X-ray and gamma ray satellites.
Astr 342 (Phy 342) Relativity and Cosmology (3) spring, even-numbered years. Special and general relativity. Schwarzschild and Kerr black holes. Supermassive stars. Theories of the origin and evolution of the universe.
Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering majors who desire to study an active area of research in astrophysics. Individual supervision.

Minor in astronomy listed under mathematics requiring: PHY 21, Astr 105, Astr 201 and 202, and one Astr course at 300 level, plus two courses (minimum of 6 credit hours) selected from among the following; any Astronomy course except Astr 7, 8, Csc 17, Math 208, 231, Phy 31, 213, 215, 348, 362
Sayre Observatory "Once housed a telescope" now houses the graduate student council.

2006-2007 Catalog – Special Collections
Instructors: George E. McCluskey Jr., A.B., M.S., Ph.D., Professor of Physics, Gary G. DeLeo, B.S., M.S., Ph.D. Professor of Physics.
Majors in Astronomy and Astrophysics listed. B.A. in Astronomy and B.S. in Astrophysics.
Courses: Under Astronomy, offered in the department of Physics:
Astr. 7 (Phy 7) Introduction to Astronomy (3) fall – Introduction to planetary, stellar, galactic, and extragalactic astronomy. An examination of the surface characteristics, atmospheres, and motions of planets and other bodies in our solar systems. Properties of the sun, stars, and galaxies, including the birth and death of stars, stellar explosions, and the formation of stellar remnants such as white dwarfs, neutron stars, pulsars, and black holes. Quasars, cosmology, and the evolution of the universe.
Astr 8. (Phy 8) Introduction to Astronomy Laboratory (1) fall, laboratory to accompany Astr/Phy 7.
Astr. 105 (Phy 105, EES 105) Planetary Astronomy (4) fall. Structure and dynamics of planetary interiors, surfaces, and atmospheres. Models for the formation of the solar system and planetary evolution. Internal structure, surface topology, and composition of planets and other bodies in our solar system. Comparative study of planetary atmospheres. Organic materials in the solar system. Properties of the interplanetary medium, including dust and meteoroids. Orbital dynamics. Extrasolar planetary systems.
Astr 110 (Phy 110) Methods of Observational Astronomy (1) spring. Techniques of astronomical observation, data reduction, and analysis. Photometry, spectroscopy, CCD imaging, and interferometry. Computational analysis. Examination of ground based and spacecraft instrumentation, and data transmission, reduction, and analysis.
For advanced Undergraduates and Graduate Students
Astr 201 (Phy 201) Modern Astrophysics I (4) fall. Physics of stellar atmospheres and interiors, and the formation, evolution, and death of stars. Variable stars. The evolution of binary star systems. Novae, supernovae, white dwarfs, neutron stars, pulsars, and black holes. Stellar spectra, chemical compositions, and thermodynamics processes. Thermonuclear reactions. Interstellar medium.
Astr 202 (Phy 202) Modern Astrophysics II (4) spring. The Milky Way Galaxy, galactic morphology, and evolutionary processes. Active galaxies and quasars. Observed properties of the universe. Relativistic cosmology, and the origin, evolution and fate of the universe. Elements of General Relativity and associated phenomena.
Astr 332 (Phy 332 High Energy Astrophysics (3) spring, odd-numbered years. Observation and theory of X-ray and gamma ray sources, quasars, pulsars, radio galaxies, neutron stars, black holes. Results from ultraviolet, X-ray and gamma ray satellites.
Astr 342 (Phy 342) Relativity and Cosmology (3) spring, even-numbered years. Special and general relativity. Schwarzschild and Kerr black holes. Supermassive stars. Theories of the origin and evolution of the universe.

Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering majors who desire to study an active area of research in astrophysics. Individual supervision.
Minor in astronomy listed under mathematics requiring: PHY 21, Astr 105, Astr 201 and 202, and one Astr course at 300 level, plus two courses (minimum of 6 credit hours) selected from among the following; any Astronomy course except Astr 7, 8, Csc 17, Math 208, 231, Phy 31, 213, 215, 348, 362
Sayre Observatory "Once housed a telescope".

2007-2008 Catalog – Special Collections
Instructors: George E. McCluskey Jr., A.B., M.S., Ph.D., Professor of Physics, Gary G. DeLeo, B.S., M.S., Ph.D. Professor of Physics.
Majors in Astronomy and Astrophysics listed. B.A. in Astronomy and B.S. in Astrophysics.
Courses: Under Astronomy, offered in the department of Physics:
Astr. 7 (Phy 7) Introduction to Astronomy (3) fall – Introduction to planetary, stellar, galactic, and extragalactic astronomy. AN examination of the surface characteristics, atmospheres, and motions of planets and other bodies in our solar systems. Properties of the sun, stars, and galaxies, including the birth and death of stars, stellar explosions, and the formation of stellar remnants such as white dwarfs, neutron stars, pulsars, and black holes. Quasars, cosmology, and the evolution of the universe.
Astr 8. (Phy 8) Introduction to Astronomy Laboratory (1) fall, laboratory to accompany Astr/Phy 7.
Astr. 105 (Phy 105, EES 105) Planetary Astronomy (4) fall. Structure and dynamics of planetary interiors, surfaces, and atmospheres. Models for the formation of the solar system and planetary evolution. Internal structure, surface topology, and composition of planets and other bodies in our solar system. Comparative study of planetary atmospheres. Organic materials in the solar system. Properties of the interplanetary medium, including dust and meteoroids. Orbital dynamics. Extrasolar planetary systems.
Astr 110 (Phy 110) Methods of Observational Astronomy (1) spring. Techniques of astronomical observation, data reduction, and analysis. Photometry, spectroscopy, CCD imaging, and interferometry. Computational analysis. Examination of ground based and spacecraft instrumentation, and data transmission, reduction, and analysis.
For advanced Undergraduates and Graduate Students
Astr 201 (Phy 201) Modern Astrophysics I (4) fall. Physics of stellar atmospheres and interiors, and the formation, evolution, and death of stars. Variable stars. The evolution of binary star systems. Novae, supernovae, white dwarfs, neutron stars, pulsars, and black holes. Stellar spectra, chemical compositions, and thermodynamics processes. Thermonuclear reactions. Interstellar medium.
Astr 202 (Phy 202) Modern Astrophysics II (4) spring. The Milky Way Galaxy, galactic morphology, and evolutionary processes. Active galaxies and quasars. Observed properties of the universe. Relativistic cosmology, and the origin, evolution and fate of the universe. Elements of General Relativity and associated phenomena.
Astr 332 (Phy 332 High Energy Astrophysics (3) spring, odd-numbered years. Observation and theory of X-ray and gamma ray sources, quasars, pulsars, radio galaxies, neutron stars, black holes. Results from ultraviolet, X-ray and gamma ray satellites.

Astr 342 (Phy 342) Relativity and Cosmology (3) spring, even-numbered years. Special and general relativity. Schwarzschild and Kerr black holes. Supermassive stars. Theories of the origin and evolution of the universe.
Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering majors who desire to study an active area of research in astrophysics. Individual supervision.
Minor in astronomy listed under mathematics requiring: PHY 21, Astr 105, Astr 201 and 202, and one Astr course at 300 level, plus two courses (minimum of 6 credit hours) selected from among the following; any Astronomy course except Astr 7, 8, Csc 17, Math 208, 231, Phy 31, 213, 215, 348, 362
Sayre Observatory "Once housed a telescope".

2008-2009 Catalog – Special Collections
Instructors: George E. McCluskey Jr., A.B., M.S., Ph.D., Professor of Physics, Gary G. DeLeo, B.S., M.S., Ph.D. Professor of Physics, M. Virginia McSwain, B.S., M.S., Ph.D. Assistant Professor of Physics.
Majors in Astronomy and Astrophysics listed. B.A. in Astronomy and B.S. in Astrophysics.
Courses: Under Astronomy, offered in the department of Physics:
Astr. 7 (Phy 7) Introduction to Astronomy (3) fall – Introduction to planetary, stellar, galactic, and extragalactic astronomy. An examination of the surface characteristics, atmospheres, and motions of planets and other bodies in our solar systems. Properties of the sun, stars, and galaxies, including the birth and death of stars, stellar explosions, and the formation of stellar remnants such as white dwarfs, neutron stars, pulsars, and black holes. Quasars, cosmology, and the evolution of the universe.
Astr 8. (Phy 8) Introduction to Astronomy Laboratory (1) fall, laboratory to accompany Astr/Phy 7.
Astr. 105 (Phy 105, EES 105) Planetary Astronomy (4) fall. Structure and dynamics of planetary interiors, surfaces, and atmospheres. Models for the formation of the solar system and planetary evolution. Internal structure, surface topology, and composition of planets and other bodies in our solar system. Comparative study of planetary atmospheres. Organic materials in the solar system. Properties of the interplanetary medium, including dust and meteoroids. Orbital dynamics. Extrasolar planetary systems.
Astr 110 (Phy 110) Methods of Observational Astronomy (1) spring. Techniques of astronomical observation, data reduction, and analysis. Photometry, spectroscopy, CCD imaging, and interferometry. Computational analysis. Examination of ground based and spacecraft instrumentation, and data transsission, reduction, and analysis.
For advanced Undergraduates and Graduate Students
Astr 201 (Phy 201) Modern Astrophysics I (4) fall. Physics of stellar atmospheres and interiors, and the formation, evolution, and death of stars. Variable stars. The evolution of binary star systems. Novae, supernovae, white dwarfs, neutron stars, pulsars, and black holes. Stellar spectra, chemical compositions, and thermodynamics processes. Thermonuclear reactions. Interstellar medium.
Astr 202 (Phy 202) Modern Astrophysics II (4) spring. The Milky Way Galaxy, galactic morphology, and evolutionary processes. Active galaxies and quasars. Observed properties of the universe. Relativistic cosmology, and the origin, evolution and fate of the universe. Elements of General Relativity and associated phenomena.

Astr 332 (Phy 332 High Energy Astrophysics (3) spring, odd-numbered years. Observation and theory of X-ray and gamma ray sources, quasars, pulsars, radio galaxies, neutron stars, black holes. Results from ultraviolet, X-ray and gamma ray satellites.
Astr 342 (Phy 342) Relativity and Cosmology (3) spring, even-numbered years. Special and general relativity. Schwarzschild and Kerr black holes. Supermassive stars. Theories of the origin and evolution of the universe.
Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering majors who desire to study an active area of research in astrophysics. Individual supervision.
Minor in astronomy listed under mathematics requiring : PHY 21, Astr 105, Astr 201 and 202, and one Astr course at 300 level, plus two courses (minimum of 6 credit hours) selected from among the following; any Astronomy course except Astr 7, 8, Csc 17, Math 208, 231, Phy 31, 213, 215, 348, 362.
Sayre Observatory "Once housed a telescope".

2009-2010 Catalog – Special Collections
Instructors: George E. McCluskey Jr., A.B., M.S., Ph.D., Professor of Physics, Gary G. DeLeo, B.S., M.S., Ph.D. Professor of Physics, M. Virginia McSwain, B.S., M.S., Ph.D. Assistant Professor of Physics.
Majors in Astronomy and Astrophysics listed. B.A. in Astronomy and B.S. in Astrophysics.
Courses: Under Astronomy, offered in the department of Physics:
Astr. 7 (Phy 7) Introduction to Astronomy (3) fall – Introduction to planetary, stellar, galactic, and extragalactic astronomy. AN examination of the surface characteristics, atmospheres, and motions of planets and other bodies in our solar systems. Properties of the sun, stars, and galaxies, including the birth and death of stars, stellar explosions, and the formation of stellar remnants such as white dwarfs, neutron stars, pulsars, and black holes. Quasars, cosmology, and the evolution of the universe.
Astr 8. (Phy 8) Introduction to Astronomy Laboratory (1) fall, laboratory to accompany Astr/Phy 7.
Astr. 105 (Phy 105, EES 105) Planetary Astronomy (4) fall. Structure and dynamics of planetary interiors, surfaces, and atmospheres. Models for the formation of the solar system and planetary evolution. Internal structure, surface topology, and composition of planets and other bodies in our solar system. Comparative study of planetary atmospheres. Organic materials in the solar system. Properties of the interplanetary medium, including dust and meteoroids. Orbital dynamics. Extrasolar planetary systems.
Astr 110 (Phy 110) Methods of Observational Astronomy (1) spring. Techniques of astronomical observation, data reduction, and analysis. Photometry, spectroscopy, CCD imaging, and interferometry. Computational analysis. Examination of ground based and spacecraft instrumentation, and data transsission, reduction, and analysis.
For advanced Undergraduates and Graduate Students
Astr 201 (Phy 201) Modern Astrophysics I (4) fall. Physics of stellar atmospheres and interiors, and the formation, evolution, and death of stars. Variable stars. The evolution of binary star systems. Novae, supernovae, white dwarfs, neutron stars, pulsars, and black holes. Stellar spectra, chemical compositions, and thermodynamics processes. Thermonuclear reactions. Interstellar medium.

Astr 202 (Phy 202) Modern Astrophysics II (4) spring. The Milky Way Galaxy, galactic morphology, and evolutionary processes. Active galaxies and quasars. Observed properties of the universe. Relativistic cosmology, and the origin, evolution and fate of the universe. Elements of General Relativity and associated phenomena.
Astr 332 (Phy 332 High Energy Astrophysics (3) spring, odd-numbered years. Observation and theory of X-ray and gamma ray sources, quasars, pulsars, radio galaxies, neutron stars, black holes. Results from ultraviolet, X-ray and gamma ray satellites.
Astr 342 (Phy 342) Relativity and Cosmology (3) spring, even-numbered years. Special and general relativity. Schwarzschild and Kerr black holes. Supermassive stars. Theories of the origin and evolution of the universe.
Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering majors who desire to study an active area of research in astrophysics. Individual supervision.
Minor in astronomy listed under mathematics requiring: PHY 21, Astr 105, Astr 201 and 202, and one Astr course at 300 level, plus two courses (minimum of 6 credit hours) selected from among the following; any Astronomy course except Astr 7, 8, Csc 17, Math 208, 231, Phy 31, 213, 215, 348, 362
Sayre Observatory "Once housed a telescope".

2010's

2010-2011 Catalog – Special Collections
Instructors: George E. McCluskey Jr., A.B., M.S., Ph.D., Professor of Physics, Gary G. DeLeo, B.S., M.S., Ph.D. Professor of Physics, M. Virginia McSwain, B.S., M.S., Ph.D. Assistant Professor of Physics.
Majors in Astronomy and Astrophysics listed. B.A. in Astronomy and B.S. in Astrophysics.
Courses: Under Astronomy, offered in the department of Physics:
Astr. 7 (Phy 7) Introduction to Astronomy (3) fall – Introduction to planetary, stellar, galactic, and extragalactic astronomy. AN examination of the surface characteristics, atmospheres, and motions of planets and other bodies in our solar systems. Properties of the sun, stars, and galaxies, including the birth and death of stars, stellar explosions, and the formation of stellar remnants such as white dwarfs, neutron stars, pulsars, and black holes. Quasars, cosmology, and the evolution of the universe.
Astr 8. (Phy 8) Introduction to Astronomy Laboratory (1) fall, laboratory to accompany Astr/Phy 7.
Astr. 105 (Phy 105, EES 105) Planetary Astronomy (4) fall. Structure and dynamics of planetary interiors, surfaces, and atmospheres. Models for the formation of the solar system and planetary evolution. Internal structure, surface topology, and composition of planets and other bodies in our solar system. Comparative study of planetary atmospheres. Organic materials in the solar system. Properties of the interplanetary medium, including dust and meteoroids. Orbital dynamics. Extrasolar planetary systems.
Astr 110 (Phy 110) Methods of Observational Astronomy (1) spring. Techniques of astronomical observation, data reduction, and analysis. Photometry, spectroscopy, CCD imaging, and interferometry. Computational analysis. Examination of ground based and spacecraft instrumentation, and data transsission, reduction, and analysis.
For advanced Undergraduates and Graduate Students

Astr 301 (Phy 201) Modern Astrophysics I (4) fall. Physics of stellar atmospheres and interiors, and the formation, evolution, and death of stars. Variable stars. The evolution of binary star systems. Novae, supernovae, white dwarfs, neutron stars, pulsars, and black holes. Stellar spectra, chemical compositions, and thermodynamics processes. Thermonuclear reactions. Interstellar medium.
Astr 302 (Phy 202) Modern Astrophysics !! (4) spring. The Milky Way Galaxy, galactic morphology, and evolutionary processes. Active galaxies and quasars. Observed properties of the universe. Relativistic cosmology, and the origin, evolution and fate of the universe. Elements of General Relativity and associated phenomena.
Astr 332 (Phy 332 High Energy Astrophysics (3) spring, odd-numbered years. Observation and theory of X-ray and gamma ray sources, quasars, pulsars, radio galaxies, neutron stars, black holes. Results from ultraviolet, X-ray and gamma ray satellites.
Astr 342 (Phy 342) Relativity and Cosmology (3) spring, even-numbered years. Special and general relativity. Schwarzschild and Kerr black holes. Supermassive stars. Theories of the origin and evolution of the universe.
Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering majors who desire to study an active area of research in astrophysics. Individual supervision.
Minor in astronomy listed under mathematics requiring: PHY 21, Astr 105, Astr 201 and 202, and one Astr course at 300 level, plus two courses (minimum of 6 credit hours) selected from among the following; any Astronomy course except Astr 7, 8, Csc 17, Math 208, 231, Phy 31, 213, 215, 348, 362.
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2011-2012 Catalog – Special Collections
Instructors: George E. McCluskey Jr., A.B., M.S., Ph.D., Professor of Physics, Gary G. DeLeo, B.S., M.S., Ph.D. Professor of Physics, M. Virginia McSwain, B.S., M.S., Ph.D. Assistant Professor of Physics.
Majors in Astronomy and Astrophysics listed. B.A. in Astronomy and B.S. in Astrophysics.
Courses: Under Astronomy, offered in the department of Physics:
Astr. 7 (Phy 7) Introduction to Astronomy (3) fall – Introduction to planetary, stellar, galactic, and extragalactic astronomy. AN examination of the surface characteristics, atmospheres, and motions of planets and other bodies in our solar systems. Properties of the sun, stars, and galaxies, including the birth and death of stars, stellar explosions, and the formation of stellar remnants such as white dwarfs, neutron stars, pulsars, and black holes. Quasars, cosmology, and the evolution of the universe.
Astr 8. (Phy 8) Introduction to Astronomy Laboratory (1) fall, laboratory to accompany Astr/Phy 7.
Astr. 105 (Phy 105, EES 105) Planetary Astronomy (4) fall. Structure and dynamics of planetary interiors, surfaces, and atmospheres. Models for the formation of the solar system and planetary evolution. Internal structure, surface topology, and composition of planets and other bodies in our solar system. Comparative study of planetary atmospheres. Organic materials in the solar system. Properties of the interplanetary medium, including dust and meteoroids. Orbital dynamics. Extrasolar planetary systems.
Astr 110 (Phy 110) Methods of Observational Astronomy (1) spring. Techniques of astronomical observation, data reduction, and analysis. Photometry, spectroscopy, CCD

imaging, and interferometry. Computational analysis. Examination of ground based and spacecraft instrumentation, and data transmission, reduction, and analysis.
For advanced Undergraduates and Graduate Students
Astr 301 (Phy 201) Modern Astrophysics I (4) fall. Physics of stellar atmospheres and interiors, and the formation, evolution, and death of stars. Variable stars. The evolution of binary star systems. Novae, supernovae, white dwarfs, neutron stars, pulsars, and black holes. Stellar spectra, chemical compositions, and thermodynamics processes. Thermonuclear reactions. Interstellar medium.
Astr 302 (Phy 202) Modern Astrophysics II (4) spring. The Milky Way Galaxy, galactic morphology, and evolutionary processes. Active galaxies and quasars. Observed properties of the universe. Relativistic cosmology, and the origin, evolution and fate of the universe. Elements of General Relativity and associated phenomena.
Astr 332 (Phy 332 High Energy Astrophysics (3) spring, odd-numbered years. Observation and theory of X-ray and gamma ray sources, quasars, pulsars, radio galaxies, neutron stars, black holes. Results from ultraviolet, X-ray and gamma ray satellites.
Astr 342 (Phy 342) Relativity and Cosmology (3) spring, even-numbered years. Special and general relativity. Schwarzschild and Kerr black holes. Supermassive stars. Theories of the origin and evolution of the universe.
Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering majors who desire to study an active area of research in astrophysics. Individual supervision.
Minor in astronomy listed under mathematics requiring: PHY 21, Astr 105, Astr 201 and 202, and one Astr course at 300 level, plus two courses (minimum of 6 credit hours) selected from among the following; any Astronomy course except Astr 7, 8, Csc 17, Math 208, 231, Phy 31, 213, 215, 348, 362.
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2012-2013 Catalog – Special Collections
Instructors: George E. McCluskey Jr., A.B., M.S., Ph.D., Professor of Physics, Gary G. DeLeo, B.S., M.S., Ph.D. Professor of Physics, M. Virginia McSwain, B.S., M.S., Ph.D. Assistant Professor of Physics.
Majors in Astronomy and Astrophysics listed. B.A. in Astronomy and B.S. in Astrophysics.
Courses: Under Astronomy, offered in the department of Physics:
Astr. 7 (Phy 7) Introduction to Astronomy (3) fall – Introduction to planetary, stellar, galactic, and extragalactic astronomy. An examination of the surface characteristics, atmospheres, and motions of planets and other bodies in our solar systems. Properties of the sun, stars, and galaxies, including the birth and death of stars, stellar explosions, and the formation of stellar remnants such as white dwarfs, neutron stars, pulsars, and black holes. Quasars, cosmology, and the evolution of the universe.
Astr 8. (Phy 8) Introduction to Astronomy Laboratory (1) fall, laboratory to accompany Astr/Phy 7.
Astr. 105 (Phy 105, EES 105) Planetary Astronomy (4) fall. Structure and dynamics of planetary interiors, surfaces, and atmospheres. Models for the formation of the solar system and planetary evolution. Internal structure, surface topology, and composition of planets and other bodies in our solar system. Comparative study of planetary atmospheres. Organic materials in the solar system. Properties of the interplanetary

medium, including dust and meteoroids. Orbital dynamics. Extrasolar planetary systems.
Astr 110 (Phy 110) Methods of Observational Astronomy (1) spring. Techniques of astronomical observation, data reduction, and analysis. Photometry, spectroscopy, CCD imaging, and interferometry. Computational analysis. Examination of ground based and spacecraft instrumentation, and data transmission, reduction, and analysis.
Astr 301 (Phy 201) Modern Astrophysics I (4) fall. Physics of stellar atmospheres and interiors, and the formation, evolution, and death of stars. Variable stars. The evolution of binary star systems. Novae, supernovae, white dwarfs, neutron stars, pulsars, and black holes. Stellar spectra, chemical compositions, and thermodynamics processes. Thermonuclear reactions. Interstellar medium.
Astr 302 (Phy 202) Modern Astrophysics II (4) spring. The Milky Way Galaxy, galactic morphology, and evolutionary processes. Active galaxies and quasars. Observed properties of the universe. Relativistic cosmology, and the origin, evolution and fate of the universe. Elements of General Relativity and associated phenomena.
Astr 332 (Phy 332 High Energy Astrophysics (3) spring, odd-numbered years. Observation and theory of X-ray and gamma ray sources, quasars, pulsars, radio galaxies, neutron stars, black holes. Results from ultraviolet, X-ray and gamma ray satellites.
Astr 342 (Phy 342) Relativity and Cosmology (3) spring, even-numbered years. Special and general relativity. Schwarzschild and Kerr black holes. Supermassive stars. Theories of the origin and evolution of the universe.
Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering majors who desire to study an active area of research in astrophysics. Individual supervision.
Astr 372. Special Topics in Astronomy (1-4) Selected topics not sufficiently covered in other courses.
Astr 472. Special Topics in Astronomy (1-4) Selected topics not sufficiently covered in other courses.
Minor in astronomy listed under mathematics requiring: PHY 21, Astr 105, Astr 201 and 202, and one Astr course at 300 level, plus two courses (minimum of 6 credit hours) slected from among the following; any Astronomy course except Astr 7, 8, Csc 17, Math 208, 231, Phy 31, 213, 215, 348, 362.
Sayre Observatory “Once housed a telescope”.

2013-2014 Catalog – Special Collections
Instructors: No specific professors listed.
Majors in Astronomy and Astrophysics listed. B.A. in Astronomy and B.S. in Astrophysics.
Courses: Department of Physics:
Astr. 7 (Phy 7) Introduction to Astronomy (3) fall – Introduction to planetary, stellar, galactic, and extragalactic astronomy. An examination of the surface characteristics, atmospheres, and motions of planets and other bodies in our solar systems. Properties of the sun, stars, and galaxies, including the birth and death of stars, stellar explosions, and the formation of stellar remnants such as white dwarfs, neutron stars, pulsars, and black holes. Quasars, cosmology, and the evolution of the universe.
Astr 8. (Phy 8) Introduction to Astronomy Laboratory (1) fall, laboratory to accompany Astr/Phy 7.

Astr. 105 (Phy 105, EES 105) Planetary Astronomy (4) fall. Structure and dynamics of planetary interiors, surfaces, and atmospheres. Models for the formation of the solar system and planetary evolution. Internal structure, surface topology, and composition of planets and other bodies in our solar system. Comparative study of planetary atmospheres. Organic materials in the solar system. Properties of the interplanetary medium, including dust and meteoroids. Orbital dynamics. Extrasolar planetary systems.
Astr 110 (Phy 110) Methods of Observational Astronomy (1) spring. Techniques of astronomical observation, data reduction, and analysis. Photometry, spectroscopy, CCD imaging, and interferometry. Computational analysis. Examination of ground based and spacecraft instrumentation, and data transmission, reduction, and analysis.
Astr 300 Apprentice Teaching (3).
Astr 301 (Phy 301) Modern Astrophysics I (4) fall. Physics of stellar atmospheres and interiors, and the formation, evolution, and death of stars. Variable stars. The evolution of binary star systems. Novae, supernovae, white dwarfs, neutron stars, pulsars, and black holes. Stellar spectra, chemical compositions, and thermodynamics processes. Thermonuclear reactions. Interstellar medium.
Astr 302 (Phy 302) Modern Astrophysics II (4) spring. The Milky Way Galaxy, galactic morphology, and evolutionary processes. Active galaxies and quasars. Observed properties of the universe. Relativistic cosmology, and the origin, evolution and fate of the universe. Elements of General Relativity and associated phenomena.
Astr 332 (Phy 332 High Energy Astrophysics (3) spring, odd-numbered years. Observation and theory of X-ray and gamma ray sources, quasars, pulsars, radio galaxies, neutron stars, black holes. Results from ultraviolet, X-ray and gamma ray satellites.
Astr 342 (Phy 342) Relativity and Cosmology (3) spring, even-numbered years. Special and general relativity. Schwarzschild and Kerr black holes. Supermassive stars. Theories of the origin and evolution of the universe.
Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering majors who desire to study an active area of research in astrophysics. Individual supervision.
Astr 372. Special Topics in Astronomy (1-4) Selected topics not sufficiently covered in other courses.
Astr 472. Special Topics in Astronomy (1-4) Selected topics not sufficiently covered in other courses.
Minor in astronomy listed under mathematics requiring: PHY 21, Astr 105, Astr 201 and 202, and one Astr course at 300 level, plus two courses (minimum of 6 credit hours) slected from among the following; any Astronomy course except Astr 7, 8, Csc 17, Math 208, 231, Phy 31, 213, 215, 348, 362.
Sayre Observatory “Once housed a telescope”.

2014-2015 Catalog – Special Collections
Instructors: No specific professors listed.
Majors in Astronomy and Astrophysics listed. B.A. in Astronomy and B.S. in Astrophysics.
Courses: Department of Physics:
Astr. 7 (Phy 7) Introduction to Astronomy (3) fall – Introduction to planetary, stellar, galactic, and extragalactic astronomy. AN examination of the surface characteristics, atmospheres, and motions of planets and other bodies in our solar systems. Properties of

the sun, stars, and galaxies, including the birth and death of stars, stellar explosions, and the formation of stellar remnants such as white dwarfs, neutron stars, pulsars, and black holes. Quasars, cosmology, and the evolution of the universe.
Astr 8. (Phy 8) Introduction to Astronomy Laboratory (1) fall, laboratory to accompany Astr/Phy 7.
Astr. 105 (Phy 105, EES 105) Planetary Astronomy (4) fall. Structure and dynamics of planetary interiors, surfaces, and atmospheres. Models for the formation of the solar system and planetary evolution. Internal structure, surface topology, and composition of planets and other bodies in our solar system. Comparative study of planetary atmospheres. Organic materials in the solar system. Properties of the interplanetary medium, including dust and meteoroids. Orbital dynamics. Extrasolar planetary systems.
Astr 110 (Phy 110) Methods of Observational Astronomy (1) spring. Techniques of astronomical observation, data reduction, and analysis. Photometry, spectroscopy, CCD imaging, and interferometry. Computational analysis. Examination of ground based and spacecraft instrumentation, and data transmission, reduction, and analysis.
Astr 300 Apprentice Teaching (3).
Astr 301 (Phy 301) Modern Astrophysics I (4) fall. Physics of stellar atmospheres and interiors, and the formation, evolution, and death of stars. Variable stars. The evolution of binary star systems. Novae, supernovae, white dwarfs, neutron stars, pulsars, and black holes. Stellar spectra, chemical compositions, and thermodynamics processes. Thermonuclear reactions. Interstellar medium.
Astr 302 (Phy 302) Modern Astrophysics II (4) spring. The Milky Way Galaxy, galactic morphology, and evolutionary processes. Active galaxies and quasars. Observed properties of the universe. Relativistic cosmology, and the origin, evolution and fate of the universe. Elements of General Relativity and associated phenomena.
Astr 332 (Phy 332 High Energy Astrophysics (3) spring, odd-numbered years. Observation and theory of X-ray and gamma ray sources, quasars, pulsars, radio galaxies, neutron stars, black holes. Results from ultraviolet, X-ray and gamma ray satellites.
Astr 342 (Phy 342) Relativity and Cosmology (3) spring, even-numbered years. Special and general relativity. Schwarzschild and Kerr black holes. Supermassive stars. Theories of the origin and evolution of the universe.
Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering majors who desire to study an active area of research in astrophysics. Individual supervision.
Astr 372. Special Topics in Astronomy (1-4) Selected topics not sufficiently covered in other courses.
Astr 389 Honors Project (1-6)
Astr 472. Special Topics in Astronomy (1-4) Selected topics not sufficiently covered in other courses.
Minor in astronomy listed under mathematics requiring : PHY 21, Astr 105, Astr 201 and 202, and one Astr course at 300 level, plus two courses (minimum of 6 credit hours) selected from among the following; any Astronomy course except Astr 7, 8, Csc 17, Math 208, 231, Phy 31, 213, 215, 348, 362.
Sayre Observatory “Once housed a telescope”.

2015-2016 Catalog – Special Collections
Instructors: No specific professors listed.

Majors in Astronomy and Astrophysics listed. B.A. in Astronomy and B.S. in Astrophysics.
Courses: Department of Physics:
Astr. 7 (Phy 7) Introduction to Astronomy (3) fall – Introduction to planetary, stellar, galactic, and extragalactic astronomy. AN examination of the surface characteristics, atmospheres, and motions of planets and other bodies in our solar systems. Properties of the sun, stars, and galaxies, including the birth and death of stars, stellar explosions, and the formation of stellar remnants such as white dwarfs, neutron stars, pulsars, and black holes. Quasars, cosmology, and the evolution of the universe.
Astr 8. (Phy 8) Introduction to Astronomy Laboratory (1) fall, laboratory to accompany Astr/Phy 7. Astr. 105 (Phy 105, EES 105) Planetary Astronomy (4) fall. Structure and dynamics of planetary interiors, surfaces, and atmospheres. Models for the formation of the solar system and planetary evolution. Internal structure, surface topology, and composition of planets and other bodies in our solar system. Comparative study of planetary atmospheres. Organic materials in the solar system. Properties of the interplanetary medium, including dust and meteoroids. Orbital dynamics. Extrasolar planetary systems.
Astr 110 (Phy 110) Methods of Observational Astronomy (1) spring. Techniques of astronomical observation, data reduction, and analysis. Photometry, spectroscopy, CCD imaging, and interferometry. Computational analysis. Examination of ground based and spacecraft instrumentation, and data transmission, reduction, and analysis.
Astr 300 Apprentice Teaching (3).
Astr 301 (Phy 301) Modern Astrophysics I (4) fall. Physics of stellar atmospheres and interiors, and the formation, evolution, and death of stars. Variable stars. The evolution of binary star systems. Novae, supernovae, white dwarfs, neutron stars, pulsars, and black holes. Stellar spectra, chemical compositions, and thermodynamics processes. Thermonuclear reactions. Interstellar medium.
Astr 302 (Phy 302) Modern Astrophysics II (4) spring. The Milky Way Galaxy, galactic morphology, and evolutionary processes. Active galaxies and quasars. Observed properties of the universe. Relativistic cosmology, and the origin, evolution and fate of the universe. Elements of General Relativity and associated phenomena.
Astr 332 (Phy 332 High Energy Astrophysics (3) spring, odd-numbered years. Observation and theory of X-ray and gamma ray sources, quasars, pulsars, radio galaxies, neutron stars, black holes. Results from ultraviolet, X-ray and gamma ray satellites.
Astr 342 (Phy 342) Relativity and Cosmology (3) spring, even-numbered years. Special and general relativity. Schwarzschild and Kerr black holes. Supermassive stars. Theories of the origin and evolution of the universe.
Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering majors who desire to study an active area of research in astrophysics. Individual supervision.
Astr 372. Special Topics in Astronomy (1-4) Selected topics not sufficiently covered in other courses.
Astr 389 Honors Project (1-6)
Astr 472. Special Topics in Astronomy (1-4) Selected topics not sufficiently covered in other courses.
Minor in astronomy listed under mathematics requiring: PHY 21, Astr 105, Astr 201 and 202, and one Astr course at 300 level, plus two courses (minimum of 6 credit hours)

selected from among the following; any Astronomy course except Astr 7, 8, Csc 17, Math 208, 231, Phy 31, 213, 215, 348, 362.
Sayre Observatory "Once housed a telescope".

2016-2017 Catalog – Special Collections
Instructors: No specific professors listed.
Majors in Astronomy and Astrophysics listed. B.A. in Astronomy and B.S. in Astrophysics.
Courses: Department of Physics:
Astr. 007 Introduction to Astronomy (3) fall – Introduction to planetary, stellar, galactic, and extragalactic astronomy. AN examination of the surface characteristics, atmospheres, and motions of planets and other bodies in our solar systems. Properties of the sun, stars, and galaxies, including the birth and death of stars, stellar explosions, and the formation of stellar remnants such as white dwarfs, neutron stars, pulsars, and black holes. Quasars, cosmology, and the evolution of the universe.
Astr 008. Introduction to Astronomy Laboratory (1) fall, laboratory to accompany Astr/Phy 7.
Astr. 105 Planetary Astronomy (3) fall. Structure and dynamics of planetary interiors, surfaces, and atmospheres. Models for the formation of the solar system and planetary evolution. Internal structure, surface topology, and composition of planets and other bodies in our solar system. Comparative study of planetary atmospheres. Organic materials in the solar system. Properties of the interplanetary medium, including dust and meteoroids. Orbital dynamics. Extrasolar planetary systems. Astr 110 Methods of Observational Astronomy (1) spring. Techniques of astronomical observation, data reduction, and analysis. Photometry, spectroscopy, CCD imaging, and interferometry. Computational analysis. Examination of ground based and spacecraft instrumentation, and data transmission, reduction, and analysis.
Astr 272 Special Topics in Astronomy (1-4) Selected topics not sufficiently covered in other courses.
Astr 273 Research (2-3) Participation in current research projects being carried out within the department.
Astr 300 Apprentice Teaching (3).
Astr 301 (Phy 301) Modern Astrophysics I (4) fall. Physics of stellar atmospheres and interiors, and the formation, evolution, and death of stars. Variable stars. The evolution of binary star systems. Novae, supernovae, white dwarfs, neutron stars, pulsars, and black holes. Stellar spectra, chemical compositions, and thermodynamics processes. Thermonuclear reactions. Interstellar medium.
Astr 302 (Phy 302) Modern Astrophysics II (4) spring. The Milky Way Galaxy, galactic morphology, and evolutionary processes. Active galaxies and quasars. Observed properties of the universe. Relativistic cosmology, and the origin, evolution and fate of the universe. Elements of General Relativity and associated phenomena.
Astr 332 (Phy 3320 High Energy Astrophysics (3) spring, odd-numbered years. Observation and theory of X-ray and gamma ray sources, quasars, pulsars, radio galaxies, neutron stars, black holes. Results from ultraviolet, X-ray and gamma ray satellites.

Astr 342 (Phy 342) Relativity and Cosmology (3) spring, even-numbered years. Special and general relativity. Schwarzschild and Kerr black holes. Supermassive stars. Theories of the origin and evolution of the universe.
Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering majors who desire to study an active area of research in astrophysics. Individual supervision.
Astr 372. Special Topics in Astronomy (1-4) Selected topics not sufficiently covered in other courses. Astr 389 Honors Project (1-6) Astr 472. Special Topics in Astronomy (1-4) Selected topics not sufficiently covered in other courses.
Minor in astronomy listed under mathematics requiring: PHY 21, Astr 105, Astr 201 and 202, and one Astr course at 300 level, plus two courses (minimum of 6 credit hours) selected from among the following; any Astronomy course except Astr 7, 8, Csc 17, Math 208, 231, Phy 31, 213, 215, 348, 362.
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2017-2018 Catalog – Special Collections
Instructors: No specific professors listed.
Majors in Astronomy and Astrophysics listed. B.A. in Astronomy and B.S. in Astrophysics.
Courses: Department of Physics:
Astr. 007 Introduction to Astronomy (3) fall – Introduction to planetary, stellar, galactic, and extragalactic astronomy. An examination of the surface characteristics, atmospheres, and motions of planets and other bodies in our solar systems. Properties of the sun, stars, and galaxies, including the birth and death of stars, stellar explosions, and the formation of stellar remnants such as white dwarfs, neutron stars, pulsars, and black holes. Quasars, cosmology, and the evolution of the universe.
Astr 008. Introduction to Astronomy Laboratory (1) fall, laboratory to accompany Astr/Phy 7.
Astr. 105 Planetary Astronomy (3) fall. Structure and dynamics of planetary interiors, surfaces, and atmospheres. Models for the formation of the solar system and planetary evolution. Internal structure, surface topology, and composition of planets and other bodies in our solar system. Comparative study of planetary atmospheres. Organic materials in the solar system. Properties of the interplanetary medium, including dust and meteoroids. Orbital dynamics. Extrasolar planetary systems. Astr 110 Methods of Observational Astronomy (1) spring. Techniques of astronomical observation, data reduction, and analysis. Photometry, spectroscopy, CCD imaging, and interferometry. Computational analysis. Examination of ground based and spacecraft instrumentation, and data transmission, reduction, and analysis.
Astr 272 Special Topics in Astronomy (1-4) Selected topics not sufficiently covered in other courses.
Astr 273 Research (2-3) Participation in current research projects being carried out within the department.
Astr 300 Apprentice Teaching (3).
Astr 301 (Phy 301) Modern Astrophysics I (4) fall. Physics of stellar atmospheres and interiors, and the formation, evolution, and death of stars. Variable stars. The evolution of binary star systems. Novae, supernovae, white dwarfs, neutron stars, pulsars, and black

holes. Stellar spectra, chemical compositions, and thermodynamics processes. Thermonuclear reactions. Interstellar medium.
Astr 302 (Phy 302) Modern Astrophysics II (4) spring. The Milky Way Galaxy, galactic morphology, and evolutionary processes. Active galaxies and quasars. Observed properties of the universe. Relativistic cosmology, and the origin, evolution and fate of the universe. Elements of General Relativity and associated phenomena.
Astr 332 (Phy 3320 High Energy Astrophysics (3) spring, odd-numbered years. Observation and theory of X-ray and gamma ray sources, quasars, pulsars, radio galaxies, neutron stars, black holes. Results from ultraviolet, X-ray and gamma ray satellites.
Astr 342 (Phy 342) Relativity and Cosmology (3) spring, even-numbered years. Special and general relativity. Schwarzschild and Kerr black holes. Supermassive stars. Theories of the origin and evolution of the universe.
Astr 350. Topics in Astrophysics (3) fall-spring. For science or engineering majors who desire to study an active area of research in astrophysics. Individual supervision.
Astr 372. Special Topics in Astronomy (1-4) Selected topics not sufficiently covered in other courses.
Astr 389 Honors Project (1-6)
Astr 472. Special Topics in Astronomy (1-4) Selected topics not sufficiently covered in other courses.
Minor in astronomy listed under mathematics requiring: PHY 21, Astr 105, Astr 201 and 202, and one Astr course at 300 level, plus two courses (minimum of 6 credit hours) selected from among the following; any Astronomy course except Astr 7, 8, Csc 17, Math 208, 231, Phy 31, 213, 215, 348, 362.
Sayre Observatory “Once housed a telescope”.

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Interviews: JAP, GGD, MVM, GEM