Oregon State University
Ecampus

Course Name: A Women's History of Outer Space
Course Number: HSTS 452
Credits: 4
Instructor name: Robert Peckyno
Instructor email: peckynor@oregonstate.edu

Course Description

The traditional History of Outer Space if often described through the works of dedicated astronomers, engineers, scientists, and astronauts… most of whom were men. However, since early Babylon, women have also observed the sky, performed the calculations, poured over the astronomical plates, and made significant fundamental discoveries that changed the way we see the cosmos. In the past 50 years, women have gone from purely secretarial positions to commanding the International Space Station and administering the Mars Rover Program. This course will tell their stories and the larger story of how science and society both enabled and resisted this change.

Communication

You are welcome to post all course-related questions in the General Discussion Forum so that the whole class may benefit from our conversation or contact me directly via email. Please use email for matters of a personal nature and relating to your grade. I will reply to course-related questions and email within 48 hours. I will strive to return your assignments and grades for course activities to you within five days of the due date.

Course Credits

This is a 4-credit course. Each week you will have between 1-3 hours of online lecture from me supplemented with readings and videos from other sources. Typically, you will also have a weekly discussion board assignment that requires an hour or two of outside research and a short quiz. Finally, you will be required to undertake a 4-5 page research paper on a topic of your choice. Combined, this course provides approximately 120 hours of instruction, online activities, and assignments. Divided by 10, that means you should expect to spend at least 12 hours a week on course work.

Technical Assistance

If you experience any errors or problems while in your online course, contact 24-7 Canvas Support through the Help link within Canvas. If you experience computer difficulties, need help downloading a browser or plug-in, or need assistance logging into a course, contact the IS Service Desk for assistance. You can call (541) 737-8787 or visit the IS Service Desk online.

Learning Resources

The **only** book you need to obtain for this course is **'Hidden Figures' by Margot Lee Shetterly**. You can purchase used copies very cheaply online, but **it is also available at nearly every library in the US for free**. (Don't spend money if you don't have to!) Also, don't think that you've seen the movie so you've got it covered – that is very much not the case…

This course will also make extensive use of primary NASA and other US Governmental documents as well as peer reviewed journal publications, a select set of chapters from relevant texts, and online articles including (but not limited to):

- Weitekamp, Margaret A. *Right stuff, wrong sex: America's first women in space program*. JHU Press, 2004.
- Nolen, Stephanie. *Promised the moon: the untold story of the first women in the space race*. Basic Books, 2004.
- *An Adventurous Mind: Bonnie Dunbar – The Oral History of Washington's First Woman Astronaut.* An Oral History from the Legacy Project. Washington Office of Secretary of State.
- Vakoch, Douglas A., ed. *Psychology of space exploration: Contemporary research in historical perspective*. Vol. 4411. Government Printing Office, 2011.
- *Qualifications for Astronauts:* Hearing before the Special Subcommittee on the Selection of Astronauts; US House of Representatives/87th Congress. July 17&18, 1962.
- *Women in Astronomy and Space Science: Meeting the Challenges of an Increasingly Diverse Workforce.* Proceedings from the NASA Special Conference held at the University of Maryland, University College. October 21—23, 2009. Edited by Anne L. Kinney, Diana Khachadourian, Pamela S. Millar and Colleen N. Hartman
- Foster, Amy E. *Integrating Women into the Astronaut Corps: Politics and Logistics at NASA, 1972–2004*. JHU Press, 2011.
- Stone, Tanya Lee. *Almost astronauts: 13 women who dared to dream*. Candlewick Press, 2011.
- Herschel, Caroline. "An Account of a New Comet. In a Letter from Miss Caroline Herschel to Charles Blagden, MD Sec. RS." *Philosophical Transactions of the Royal Society of London* 77 (1787): 1-3.
- Hoskin, Michael. "Caroline Herschel as observer." *Journal for the History of Astronomy* 36.4 (2005): 373-406.
- Alic, Margaret. *Hypatia's heritage: A history of women in science from antiquity through the nineteenth century*. No. 720. Beacon Press, 1986.
- Iliffe, Rob, and Frances Willmoth. *Astronomy and the domestic sphere: Margaret Flamsteed and Caroline Herschel as assistant-astronomers*. 1997.
- Howard, Sethanne. "Science Has No Gender: The History of Women in Science." *Journal of the Washington Academy of Sciences* (2007): 1-15.
- Holt, Nathalia. *Rise of the rocket girls: The women who propelled us, from missiles to the moon to Mars*. Hachette UK, 2016.
- Shayler, David J., and Ian A. Moule. *Women in Space-Following Valentina*. Springer Science & Business Media, 2005.
- Schiebinger, Londa. *The mind has no sex?: Women in the origins of modern science*. Harvard University Press, 1991.
- de Lalande, Joseph Jerome Le Francais. "Ladies' astronomy Lalande." *London: Printed for Darton, Harvey, and Darton, 1815.* (1815).
- Brock, Claire. *The Comet Sweeper (Icon Science): Caroline Herschel's Astronomical Ambition*. Icon Books, 2017.
- Bernardi, Gabriella. *The Unforgotten Sisters*. Springer, Cham, Switzerland. Google Scholar, 2016.
- Mozans, H.J. Women in Science with an Introductory Chapter on Woman's long struggle for things of the mind. D. Appleton and Co., New York and London. 1913.

These will all be provided from within Canvas.

Measurable Student Learning Outcomes

(Assessment will be made through Discussion Board Assignments, Timeline Research Assignments, Research Paper, and occasional Quizzes)

At the end of this course, you will be able to:

- Analyze and compare multiple conflicting sources debating the historicity of ancient people and events.
- Reconstruct the social, economic, and political factors that granted certain women access to the technical and scientific background necessary for astronomy.
- Develop and support a historical argument using academic and other secondary sources.
- Recognize and describe how astronomical knowledge moved through time and across cultures and the roles that women played in that process.
- Describe and contextualize the known contributions of early female astronomers and infer what social and political forces enabled these discoveries including access to education and social propriety.
- Summarize how the invention and evolution of the telescope enabled non-professional enthusiasts and women to make important contributions in astronomy.
- Identify and critique the 'scientific' arguments against women as astronomers, pilots, and astronauts.
- Reconstruct the social, economic, and scientific synergies that enabled women to become a primary method of bulk data analysis and mathematical computation in international astronomy and the early US and Soviet space programs.
- Identify key early female pilots and evaluate their motivations and impacts on societies perception of flight, engineering, and discovery. Compare their opportunities and accomplishments with the male pilots of the day.
- Identify the women pilots that participated in WW1 and WW2 from various nations including the roles they played in the wars, the social - and often physical - resistance that they met with - and compare this reality with those of male pilots at the same time.
- Reconstruct the social and political pressures that enabled women to advance and substantively contribute to the lunar program at NASA. Contrast this with the social norms that constrained that progress. Contrast the challenges of the 'East-end' computers with those of the 'West-end' computers. Argue how their battles against cultural norms were both similar and different.
- Discriminate between and critique the physical, psychological, technological, and social factors that were presented as reasons that women could not be astronauts in the US.
- Discuss the engineering challenges presented by women astronauts – especially on long duration flights and how they were overcome.
- Compare and contrast the perceived position of - and tangible opportunities for - women in the early and modern Soviet and US space programs. Analyze the reasons behind this disparity and how it changed through time.
- Examine the social and political pressures that changed during the 'Space Shuttle' era and enabled the first female astronauts in the US as well as the institutional resistance to change within NASA. Evaluate the importance of the Civil Rights Movement, Second Wave Feminism, changes in US military policy regarding female pilots, and the Equal Rights Amendment to this change.
- Contextualize the changes in education, culture, and opportunity that enabled women to rise from secretarial positions to program managers and principle scientific investigators within NASA.
- Analyze female portrayals in popular science fiction from the 1950s through the present. Compare and contrast these portrayals with the progressively growing role of women in outer space.
- Using a timeline, trace the linear history of women's participation in the various space related occupations over time and demonstrate and discuss how one generation directly impacted the next.

"In this job, you need to look like a girl, act like a lady, think like a man, and work like a dog."

- Macie Roberts / NASA-JPL

Course Content

Week	Topic
1	**Priestesses and Seers**
2	**From Assistant to Astronomer: 1600-1850AD**
3	**1850 – 1940: Professors and the Royal/Harvard Computers**
4	**Early Pilots: 1910-1945**
5	**Hidden Figures and the Early Women of NACA/NASA: 1925-1970**
6	**Valentina Terishkova and the Mercury 13 FLAT's: 1960-1965**
7	**The Shuttle Era (1980-2010)**
8	**Long Duration Co-Habitation: The Space Station Era (1990-present)**
9	**Experts, Leaders, and Owners: the Parity Quest**
10	**Science Fiction, Aliens, and Exobiology**

Discussion Participation and Expectations

I encourage participation in the class discussion via the Canvas boards. Feel free to post space related items (can be news, research, opinions, thoughts, poetry, sci-fi, etc) and make comments on what others have posted. Try and leave questions for discussion or answer others. Please be respectful in your posts (disagreements are encouraged – but support your argument!). I will be monitoring all posts and hope that this can be a fun way for the class to have larger discussions and just talk.

Students are expected to conduct themselves in the course (e.g., on discussion boards, email postings) in compliance with the university's regulations regarding civility. Contrary to what we are seeing online these days, it is possible to disagree with someone and not resort to name calling and bullying. Treat everyone like you are trying to convince your own mother. If we can't figure out a way to get on and move forward on Earth, we'll never get to stars…

Active interaction with peers and your instructor is essential to success in this online course, paying particular attention to the following:

- Unless indicated otherwise, please complete the readings and view other instructional materials for each week before participating in the discussion board.
- Read your posts carefully before submitting them. SPELLING AND GRAMAR!
- Be respectful of others and their opinions, valuing diversity in backgrounds, abilities, and experiences.
- Challenging the ideas held by others is an integral aspect of critical thinking and the academic process. Please word your responses carefully, and recognize that others are expected to challenge your ideas. A positive atmosphere of healthy debate is encouraged.
- *Your opinions are valid and interesting. However, your opinions carry more weight when you cite valid academic sources to prove your assertions. It is a simple fact that the opinions of experts with many years of experience carry more weight than yours do. That doesn't mean one is right or wrong – but you wouldn't want a freshman business student performing your heart surgery either.*

Makeup Exams

Quizzes are due on Sunday by midnight and taken down on Tuesday at midnight. Late quizzes will be assessed a 10% per day penalty.

Once the quiz comes down on Tuesday, you will not be able to take the quiz unless you have given advance notice. I repeat: Makeup quizzes will be given **only for missed quizzes excused in advance**. Excused absences will not be given for airline reservations, routine illness (colds, flu, stomach aches), or other common ailments. Excused absences will generally not be given after the absence has occurred, except under very unusual circumstances. Advanced notice means that **you must call or e-mail me before midnight on the day the quiz (usually Sunday)** or assignment is due. If I have not heard from you by Tuesday midnight, I will enter a zero for that quiz.

Late Assignment Penalties

Discussion Board and other assignments should be completed by midnight on the due date. The best option is to upload into Canvas. Discussion board assignments that are late (and not excused) will suffer a 10% per day penalty.

Incompletes

Incomplete (I) grades will be granted only in emergency cases (usually only for a death in the family, major illness or injury, or birth of your child, signing a multimillion dollar hockey contract [it happened, don't laugh]), and if the student has turned in 80% of the points possible (in other words, usually everything but the final paper). If you are having any difficulty that might prevent you completing the coursework, please don't wait until the end of the term; let me know right away!

Evaluation of Student Performance

Grading for this course is done on a point system. Each week there are multiple assignments including timeline entries, research, writing, and discussion assignments, and quizzes. Points for each of these assignments are listed under the modules section in Canvas as well as the assignment itself. Not all assignments are worth the same amount so please budget your time accordingly. It is completely possible to miss an assignment and still do well in this course, but it's a slippery slope to do so….Currently there are 780 total points possible for this course.

Grade	Percent Range
A	92-100
A-	90-92
B+	88-89
B	80-97
C	70-79
D	60-69
F	< 60

As an upper level University course, I expect your spelling, grammar, punctuation, and citations to always be the best they can be. Please be professional always!

OSU BACC CORE: SCIENCE, TECHNOLOGY, AND SOCIETY:

Successful completion of this course partially fulfills OSU's Baccalaureate Core course requirements in the Science, Technology, and Society category. Here is the official OSU description of what STS courses do. This course could not be a more perfect fit for this category.

Given the immense impact that science and technology have had on all facets of modern civilization, a disciplined study of the interaction of science and technology with society is a necessary part of general education. Students should understand the political and economic dimensions of scientific or technological change, the nature of the scientific enterprise and its relationship to technology, and the complexity of major revolutions in science and technology. OSU mandates that all STS courses:

1. *Analyze relationships among science, technology, and society using critical perspectives or examples from historical, political, or economic disciplines.*
2. *Analyze the role of science and technology in shaping diverse fields of study over time.*
3. *Articulate in writing a critical perspective on issues involving science, technology, and society using evidence as support. **

**Evidence based writing is an essential component of the Synthesis categories and the exclusively "upper-division" general education academic experience they offer to students.*

Nearly every assignment in this course will be exploring the relationship between science, technology and society through the lens of history. In this course, you will be specifically tracing the progressive scientific achievements of and social acceptance of (and resistance to) female scientists, engineers, and astronauts. You will learn how advancements in technology directly impacted the advancement of women as well as the social and political realities of the time that both enabled and constrained their advancement.

You will be required to apply these concepts on quizzes, through research and writing assignments, and class group discussions specifically focused on exploring the larger interactions between science (planetary science, life sciences, geology, physics, etc.), technology (engineering, robotics, optics, etc), and society (public policy, international relations, military support and action, religion, science fiction, etc.) and how women, in particular, have influenced the development of, benefitted from, and concurrently been constrained by all three of these over time. There will be weekly written discussions around the topic for the week where you will be required to defend these positions using academic and historical source material.

30% of the grade for the course will be a 6-8 page research paper on three space related technologies, people, or themes relevant to the course. You will be asked to research appropriate source material and provide a supported argument that historically analyzes, connects, and contextualizes your topics including the external technical and social factors and/or scientific unknowns that enabled and/or constrained the participation of women.

Finally, there will be weekly quizzes that will typically be short answer integration questions that ensure that a. you've watched the lectures and b. can integrate the individual stories into a larger point about the participation of women in space related scientific and technological disciplines.

Statement Regarding Students with Disabilities

Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval, please contact DAS immediately at 541-737-4098 or at http://ds.oregonstate.edu. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.

Accessibility of Course Materials

As far as I know, all materials used in this course are accessible. If you find something that is not, please let me know! If you require accommodations please contact Disability Access Services (DAS).

Additionally, Canvas, the learning management system through which this course is offered, provides a vendor statement certifying how the platform is accessible to students with disabilities.

Expectations for Student Conduct

Student conduct is governed by the university's policies, as explained in the Student Conduct Code. Students are expected to conduct themselves in the course (e.g., on discussion boards, email postings) in compliance with the university's regulations regarding civility.

Academic Integrity

Students are expected to comply with all regulations pertaining to academic honesty. For further information, visit Student Conduct and Community Standards, or contact the office of Student Conduct and Mediation at 541-737-3656.

OAR 576-015-0020 (2) Academic or Scholarly Dishonesty:

a) Academic or Scholarly Dishonesty is defined as an act of deception in which a Student seeks to claim credit for the work or effort of another person, or uses unauthorized materials or fabricated information in any academic work or research, either through the Student's own efforts or the efforts of another.
b) It includes:

i) CHEATING - use or attempted use of unauthorized materials, information or study aids, or an act of deceit by which a Student attempts to misrepresent mastery of academic effort or information. This includes but is not limited to unauthorized copying or collaboration on a test or assignment, using prohibited materials and texts, any misuse of an electronic device, or using any deceptive means to gain academic credit.
ii) FABRICATION - falsification or invention of any information including but not limited to falsifying research, inventing or exaggerating data, or listing incorrect or fictitious references.
iii) ASSISTING - helping another commit an act of academic dishonesty. This includes but is not limited to paying or bribing someone to acquire a test or assignment, changing someone's grades or academic records, taking a test/doing an assignment for someone else by any means, including misuse of an electronic device. It is a violation of Oregon state law to create and offer to sell part or all of an educational assignment to another person (ORS 165.114).
iv) TAMPERING - altering or interfering with evaluation instruments or documents.
v) PLAGIARISM - representing the words or ideas of another person or presenting someone else's words, ideas, artistry or data as one's own, or using one's own previously submitted work. Plagiarism includes but is not limited to copying another person's work (including unpublished material) without appropriate referencing, presenting someone else's opinions and theories as one's own, or working jointly on a project and then submitting it as one's own.

c) Academic Dishonesty cases are handled initially by the academic units, following the process outlined in the University's Academic Dishonesty Report Form, and will also be referred to SCCS for action under these rules.

Tutoring and Writing Assistance

NetTutor is a leading provider of online tutoring and learner support services fully staffed by experienced, trained and monitored tutors. Students connect to live tutors from any computer that has Internet access. NetTutor provides a virtual whiteboard that allows tutors and students to work on problems in a real time environment. They also have an online writing suite where tutors critique and return essays within 24 to 48 hours. Access NetTutor from within your Canvas class by clicking on the Tools button in your course menu.

The Oregon State Online Writing Suite is also available for students enrolled in Ecampus courses.

TurnItIn

Your will be turning in your papers via Turnitin, a plagiarism prevention service. Your assignment content will be checked for potential plagiarism against Internet sources, academic journal articles, and the papers of other OSU students, for common or borrowed content. Turnitin generates a report that highlights any potentially unoriginal text in your paper. The report may be submitted directly to your instructor or your instructor may elect

to have you submit initial drafts through Turnitin, and you will receive the report allowing you the opportunity to make adjustments and ensure that all source material has been properly cited. You will retain all rights to your written work. For further information, visit Academic Integrity for Students: Turnitin – What is it?

Student Evaluation of Courses

The online Student Evaluation of Teaching system opens to students during the week before finals and closes the Monday following the end of finals. Students receive notification, instructions and the link through their ONID. They may also log into the system via Online Services. Course evaluation results are extremely important and used to help improve courses and the online learning experience for future students. Responses are anonymous (unless a student chooses to "sign" their comments, agreeing to relinquish anonymity) and unavailable to instructors until after grades have been posted. The results of scaled questions and signed comments go to both the instructor and their unit head/supervisor. Anonymous (unsigned) comments go to the instructor only.

NOTE: I take your feedback VERY seriously. I genuinely want this to be one of the best and most interesting courses you have ever taken. I want it to challenge you. I want you to leave feeling that you learned something that will stick with you. I change this course every term in response to student feedback. Please tell me what you felt was good and what didn't quite work. It is your chance to directly impact the next generation of students.

And finally, for your consideration:

It is easy to think of humanity's future in Outer Space as some far off crazy thing that only extreme geeks have the slightest chance of being a part of. I assure you this is not true. No matter what your major is, there are people today working in the space arena doing what you do. Accountants, Artists, Video Production Techs, Social Media Guru's, Business Leaders, Industrial Fabricators, Chefs, etc. all have opportunities right now. If you have a genuine interest, there are a host of real and tangible opportunities for YOU to help create the future. **Oregon NASA Space Grant supports students every year with NASA internships, fellowships, scholarships, and more.**

Sometimes all it takes is one small step! (and not just for man…)

"When I'm asked about the relevance to Black people of what I do, I take that as an affront. It presupposes that Black people have never been involved in exploring the heavens, but this is not so. Ancient African empires -- Mali, Songhai, Egypt -- had scientists, astronomers. The fact is that space and its resources belong to all of us, not to any one group."

- Mae Jamison