PHYSICS (PHYSICS)

Physics Courses

PHYSICS 100 Quantitative Preparation for Physics
2 cr. Undergraduate.
Introductory course in general physics designed for the student with little or no previous science training.
Prerequisites: Math Placement Level 10.
Course Rules: Fee for 3 cr assessed. Not open to students w/cr in Physics 110(ER), 120(ER), or 209(ER).
Last Taught: Fall 2019, Spring 2015, Fall 2014, Spring 2014.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 103 Introduction to Research in Physics
1 cr. Undergraduate.
Learn about careers available to physics majors, talk with faculty about their research, and learn how physics applies to other disciplines and fields.
Prerequisites: none.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 105 Physics of Life
3 cr. Undergraduate.
Introductory college physics with focus on living matter. Modern fundamental principles of biological physics, with emphasis on the rules of life.
Prerequisites: none.
Course Rules: 2 hrs lec, 2 hrs lab.
General Education Requirements: Natural Science & Wellness Lab
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 107 Physics in Everyday Life
3 cr. Undergraduate.
Selected topics for citizens in a technological world. Emphasis on those aspects of science important to an understanding of our surroundings. For non-science majors.
Prerequisites: Math Placement Level 10 or consent of instructor.
Course Rules: May not be taken conc with or after having taken PHYSICS 120(ER) or PHYSICS 209(ER).
General Education Requirements: Natural Science and Wellness
Last Taught: Fall 2025, Spring 2025, Fall 2024, Spring 2024.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 108 Laboratory for Physics in Everyday Life
1 cr. Undergraduate.
Experiments correlated with PHYSICS 107.
Prerequisites: PHYSICS 107(C).
General Education Requirements: Natural Science & Wellness Lab
Last Taught: Fall 2025, Spring 2025, Fall 2024, Spring 2024.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 110 Physics for the Health Professions
4 cr. Undergraduate.
An introductory course without laboratory for students in health-related pre-professional programs. Topics include mechanics, fluids, heat, sound, electricity, magnetism, electrical devices, optics, and radioactivity. 3 hrs lec, 1 hr dis.
Prerequisites: H.S. general science; Math Placement Level 20.
Course Rules: May not be taken conc with or after having taken Physics 120(ER) or 209(ER).
Last Taught: Fall 2021, Fall 2020, Fall 2019, Spring 2019.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 120 General Physics I (Non-Calculus Treatment)
4 cr. Undergraduate.
Mechanics, wave motion, heat, and sound.
Prerequisites: Math Placement Level 30 or grade of C or better in PHYSICS 100(P); HS trigonometry or PHYSICS 100 strongly recommended.
Course Rules: 3 hrs lec, 2 hrs dis. Any combination of PHYSICS 120, PHYSICS 121, PHYSICS 209, PHYSICS 214, and PHYSICS 219 carries max 5 cr toward graduation.
General Education Requirements: Natural Science and Wellness
Last Taught: Fall 2025, Summer 2025, Spring 2025, Fall 2024.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 121 General Physics Laboratory I (Non-Calculus Treatment)
1 cr. Undergraduate.
Experiments correlated with lecture material of PHYSICS 120.
Prerequisites: PHYSICS 120(C).
Course Rules: Any combination of PHYSICS 120, PHYSICS 121, PHYSICS 209, PHYSICS 214, and PHYSICS 219 carries max 5 cr toward graduation.
General Education Requirements: Natural Science & Wellness Lab
Last Taught: Fall 2025, Summer 2025, Spring 2025, Fall 2024.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 122 General Physics II (Non-Calculus Treatment)
4 cr. Undergraduate.
Electricity, optics, modern physics. 3 hrs lec, 2 hrs dis.
Prerequisites: Physics 120(NP).
Course Rules: Any combination of Physics 122, 123, 210, 215, 220 carries 5 cr max toward graduation.
Last Taught: Fall 2025, Summer 2025, Spring 2025, Fall 2024.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 123 General Physics Laboratory II (Non-Calculus Treatment)
1 cr. Undergraduate.
Experiments on topics related to the lecture material of Physics 122.
Prerequisites: Physics 122(C).
Course Rules: Any combination of Physics 122, 123, 210, 215, 220 carries 5 cr max toward graduation.
Last Taught: Fall 2025, Summer 2025, Spring 2025, Fall 2024.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 185 Basic Physics for Teachers
3 cr. Undergraduate.
Simple machines; work, energy and power; heating and cooling; static electricity and elementary electrical circuits; waves. 2 hrs lec; 2 hrs lab/dis.
Prerequisites: Math 175(P) & cons instr.
Course Rules: Not open for cr to students with cr in Physics courses numbered 110 or above.
Last Taught: Spring 2014, Spring 2013, Spring 2012, Spring 2011.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 194 First-Year Seminar:
3 cr. Undergraduate.
The specific topics are announced in the Schedule of Classes each time the class is offered.
Prerequisites: none.
Course Rules: Open only to freshmen. Students may earn cr in just one L&S First-Year Sem (course numbers 192, 193, 194).
Last Taught: Fall 2021, Fall 2019, Fall 2017, Fall 2015.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 199 Independent Study
1-3 cr. Undergraduate.
For further information, consult dept chair.
Prerequisites: 2.0 GPA; consent of instructor, department chair, and Assistant Dean for Student Academic Services.
Course Rules: May be retaken to 6 cr max.
Last Taught: Spring 2016, Spring 2008, Fall 2003.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 209 Physics I (Calculus Treatment)
4 cr. Undergraduate.
Selected topics in mechanics, wave motion, sound, and heat. 3 hrs lec, 2 hrs dis.
Prerequisites: Math 232(C) or MATH 222(C).
Course Rules: Any combination of PHYSICS 120, PHYSICS 121, PHYSICS 209, PHYSICS 214, and PHYSICS 219 carries max 5 cr toward graduation.
Last Taught: Fall 2025, Summer 2025, Spring 2025, Fall 2024.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 210 Physics II (Calculus Treatment)
4 cr. Undergraduate.
Continuation of Physics 209. Electromagnetic field theory and optics. 3 hrs lec, 2 hrs dis.
Prerequisites: grade of C- or better in Physics 209(NP); Math 229(C) or 233(C).
Course Rules: Any combination of Physics 122, 123, 210, 215, 220 carries max 5 cr toward graduation.
Last Taught: Fall 2025, Summer 2025, Spring 2025, Fall 2024.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 214 Lab Physics I (Calculus Treatment)
1 cr. Undergraduate.
Experiments in mechanics, wave motion, heat, and thermodynamics. 3 hrs lab.
Prerequisites: Physics 209(C).
Course Rules: Any combination of Physics 120, 121, 209, 214, 219 carries 5 cr max toward graduation.
Last Taught: Fall 2025, Summer 2025, Spring 2025, Fall 2024.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 215 Lab Physics II (Calculus Treatment)
1 cr. Undergraduate.
Experiments in electricity, magnetism, and optics. 3 hrs lec.
Prerequisites: Physics 210(C).
Course Rules: Any combination of Physics 122, 123, 210, 215, 220 carries 5 cr max toward graduation.
Last Taught: Fall 2025, Summer 2025, Spring 2025, Fall 2024.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 219 Physics I: Calculus-Based, Studio Format
5 cr. Undergraduate.
Basic kinematics; Newton. Selected topics in mechanics, wave motion, sound, and heat. 8 hrs lec/lab.
Prerequisites: Math 227(C), 228(C), or 232(C).
Course Rules: Not open to students w/cr in Physics 209. Any combination of Physics 120, 121, 209, 214, 219 carries max 5 cr toward graduation.
Last Taught: Fall 2018, Fall 2017, Fall 2016, Fall 2015.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 220 Physics II: Calculus-Based, Studio Format
5 cr. Undergraduate.
Electromagnetic field theory and optics.
Prerequisites: grade of C or better in Physics 219(NP); Math 229(C) or 233(C).
Course Rules: Not open to students w/cr in Physics 210. Any combination of Physics 122, 123, 210, 215, 220 carries max 5 cr toward graduation.
Last Taught: Spring 2018, Spring 2017, Spring 2016.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 265 Physics and the Energy Problem
3 cr. Undergraduate.
Study of how the laws of physics (particularly 1st and 2nd Laws of Thermodynamics) limit society's options in dealing with scarcity of utilizable energy.
Prerequisites: H.S. algebra; Physics 107(P), 110(P), 120(P), or 209(P).
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 270 Introduction to Computational Physics
3 cr. Undergraduate.
Use of computers to solve physics problems, including particle collisions, chaotic systems, planetary motion, and other topics related to relativity and quantum mechanics.
Prerequisites: Physics 209(P); Math 233(C).
Last Taught: Spring 2008, Fall 2006, Fall 2005, Fall 2004.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 289 Internship in Physics, Lower Division
1-6 cr. Undergraduate.
Application of basic principles of physics in a research, business, organizational, educational, political, or other appropriate setting.
Prerequisites: introductory course in physics; 2.25 GPA and consent of supervising faculty member.
Course Rules: One cr earned for academic work based on 40 hours in internship. May be retaken to 6 cr max.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 296 UROP Apprenticeship
1-3 cr. Undergraduate.
Undergraduate research participation in a project developed with a supervising member of the faculty or staff.
Prerequisites: acceptance into UROP; prior or conc reg in UROP seminar.
Course Rules: One cr for 45 hrs research. May be retaken to 9 cr max in any combination of UROP apprenticeship courses.
Last Taught: Spring 2022, Spring 2018, Spring 2017, Fall 2016.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 297 Study Abroad:
1-12 cr. Undergraduate.
Designed to enroll students in UWM sponsored program before course work level, content, and credits are determined and/or in specially prepared program course work.
Prerequisites: acceptance for Study Abroad Program.
Course Rules: May be retaken with change in topic.
Last Taught: Spring 2024, Spring 2015, Summer 2011, Spring 2010.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 299 Ad Hoc:
1-6 cr. Undergraduate.
Course created expressly for offering in a specified enrollment period. Requires only dept & assoc dean approval. In exceptional circumstances, can be offered in one add'l sem.
Prerequisites: none; add'l prereqs may be assigned to specific topic.
Course Rules: May be retaken w/chg in topic.
Last Taught: Fall 2022, Fall 1994, Fall 1991, Spring 1991.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 305 Medical Physics
3 cr. Undergraduate.
Applications of physics to living systems & medical diagnostics. 3 hrs lec.
Prerequisites: grade of B+ or better in Physics 209(P). (Conc reg in Physics 210 strongly recom).
Course Rules: Primarily for premed students and others in the medical & biological sciences. Approved for Premed Stds Cert Prog.
Last Taught: Spring 2011, Fall 2004, Spring 2003, Spring 2002.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 306 Introduction to Biophysics
3 cr. Undergraduate.
Physical foundations of cellular phenomena; physical laws of complex biological systems; imaging and instrumentation for biophysics.
Prerequisites: PHYSICS 122(P) or PHYSICS 210(P); CHEM 104(P) or CHEM 105(P).
Course Rules: 3 hrs lec.
Last Taught: Fall 2024, Spring 2022, Spring 2020, Fall 2017.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 308 Introduction to Experimental Approaches in Biophysics
3 cr. Undergraduate.
Combined lectures about techniques in biophysics with statistical analysis, basic computer programming, and some lab work.
Prerequisites: none.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 309 Physics III: Modern Physics
3 cr. Undergraduate.
Elementary quantum physics, atomic and molecular physics, solid state and nuclear physics.
Prerequisites: junior standing, a grade of B- or better in PHYSICS 210(NP) or PHYSICS 220(NP); a grade of B- or better in MATH 233(P); and MATH 234(C) or ELECENG 234(C); or consent of instructor.
Course Rules: Not open for cr to students who have cr in PHYSICS 341.
Last Taught: Fall 2025, Spring 2025, Fall 2024, Fall 2023.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 317 Thermodynamics
3 cr. Undergraduate.
Classical thermodynamics, including entropy, the use of thermodynamic potentials, and applications to pressure-volume and other systems. Some basic statistical physics may be included.
Prerequisites: Physics 210(NP).
Last Taught: Spring 2025, Spring 2024, Spring 2023, Spring 2022.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 325 Optics
4 cr. Undergraduate.
Geometric and physical optics, image formation, interference, diffraction, polarization, optical instruments, resolving power, coherence, lasers, holography. Selected experiments in optics. Studio-format course.
Prerequisites: MATH 234(P) and PHYSICS 309(C); or consent of instructor.
Course Rules: Counts as repeat of PHYSICS 325 & 2 cr of PHYSICS 410.
Last Taught: Spring 2025, Spring 2024, Spring 2023, Spring 2022.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 351 Basics of Condensed Matter Physics
3 cr. Undergraduate.
Basic principles of condensed-matter physics. Crystals and amorphous materials; bonding; magnetic, thermal, and transport properties; band theory.
Prerequisites: PHYSICS 309(P) or CHEM 311(P).
Course Rules: Counts as repeat of PHYSICS 499 with the same topic.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 370 Analytical and Numerical Methods in Physics
3 cr. Undergraduate.
Solutions to various physics problems. Applications (both analytical and numerical) from mechanics, electrodynamics, quantum mechanics, astrophysics, condensed matter physics.
Prerequisites: a grade of B- or better in MATH 233 (P), and PHYSICS 210(NP) or PHYSICS 220(NP); and MATH 234(C) or ELECENG 234(C); or consent of instructor.
Last Taught: Fall 2025, Fall 2024, Fall 2023, Fall 2022.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 381 Honors Seminar:
3 cr. Undergraduate.
Selected topics concerning history and the nature of physics as an intellectual discipline.
Prerequisites: 200-level HONORS course and consent of Honors College Director.
Course Rules: May be retaken with change in topic to 9 cr max. No cr toward major.
Last Taught: Fall 2017, Fall 2016, Fall 2013, Fall 2011.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 391 Undergraduate Research Participation
1-6 cr. Undergraduate.
Independent research for undergraduates on faculty-supervised research projects.
Prerequisites: PHYSICS 309(P) and 3.25 GPA in physics courses; or consent of instructor.
Course Rules: May be retaken with change in topic to 6 cr max; non-repeatable for change of grade.
Last Taught: Fall 2025, Spring 2025, Fall 2024, Summer 2024.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 406 Introduction to Infrared Microspectroscopy
3 cr. Undergraduate.
Microscopy and spectroscopy methods for identification of chemical composition introducing interdisciplinary opportunities in fundamental and industrial applications.
Prerequisites: BIO SCI 150(P) and BIO SCI 152(P); or PHYSICS 209(P) and PHYSICS 210(P); or CHEM 102(P) and CHEM 104(P); or CHEM 105(P).
Last Taught: Spring 2017, Spring 2016, Spring 2015, Spring 2014.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 407 Computational Physics Laboratory
3 cr. Undergraduate.
Python programming, LaTeX typesetting, numerical methods, data analysis, hands-on computational experiments.
Prerequisites: PHYSICS 210(P).
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 408 Experiments in Linear Electronics
3 cr. Undergraduate/Graduate.
Transistor and integrated circuit characteristics; electronic measurement and control.
Prerequisites: junior standing and PHYSICS 210(P).
Course Rules: No credit for students with credit in ELECENG 330(R).
Last Taught: Fall 2025, Fall 2020.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 408G Experiments in Linear Electronics
3 cr. Undergraduate/Graduate.
Transistor and integrated circuit characteristics; electronic measurement and control.
Prerequisites: junior standing and PHYSICS 210(P).
Course Rules: No credit for students with credit in ELECENG 330(R).
Last Taught: Fall 2025, Fall 2020.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 409 Modern Physics Laboratory
3 cr. Undergraduate.
Selected experiments in modern physics using advanced lab instrumentation.
Prerequisites: junior standing and PHYSICS 309(P); or consent of instructor.
Last Taught: Spring 2025, Spring 2024, Fall 2023, Spring 2023.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 411 Mechanics
4 cr. Undergraduate/Graduate.
Kinematics, vector analysis, conservation laws, oscillations, variational methods, chaos, Lagrangian and Hamiltonian mechanics.
Prerequisites: junior standing and PHYSICS 210(NP).
Last Taught: Spring 2025.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 411G Mechanics
4 cr. Undergraduate/Graduate.
Kinematics, vector analysis, conservation laws, oscillations, variational methods, chaos, Lagrangian and Hamiltonian mechanics.
Prerequisites: junior standing and PHYSICS 210(NP).
Last Taught: Spring 2025.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 420 Electricity and Magnetism I
3 cr. Undergraduate/Graduate.
Electrostatics, capacitance, boundary value problems, mulipole expansion, dielectrics, magnetostatics, vector potential, magnetic properties of matter, motional emf, inductance, Maxwell's equations in differential form.
Prerequisites: junior standing, PHYSICS 210(NP), and a grade of B- or better in MATH 325(P); or MATH 325(P) and a grade of B- or better in PHYSICS 370(P); or graduate standing.
Course Rules: Counts as repeat of 2 cr of PHYSICS 421.
Last Taught: Fall 2025.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 420G Electricity and Magnetism I
3 cr. Undergraduate/Graduate.
Electrostatics, capacitance, boundary value problems, mulipole expansion, dielectrics, magnetostatics, vector potential, magnetic properties of matter, motional emf, inductance, Maxwell's equations in differential form.
Prerequisites: junior standing, PHYSICS 210(NP), and a grade of B- or better in MATH 325(P); or MATH 325(P) and a grade of B- or better in PHYSICS 370(P); or graduate standing.
Course Rules: Counts as repeat of 2 cr of PHYSICS 421.
Last Taught: Fall 2025.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 422 Electricity and Magnetism II
3 cr. Undergraduate/Graduate.
Conservation laws in electrodynamics, Maxwell's stress tensor, electromagnetic waves, absorption, dispersion, reflection and transmission of plane electromagnetic waves, wave guides, retarded potentials, radiation, electrodynamics and relativity.
Prerequisites: junior standing and a grade of C or better in PHYSICS 420(P); or graduate standing.
Course Rules: Counts as repeat of 2 cr of PHYSICS 421.
Last Taught: Spring 2025.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 422G Electricity and Magnetism II
3 cr. Undergraduate/Graduate.
Conservation laws in electrodynamics, Maxwell's stress tensor, electromagnetic waves, absorption, dispersion, reflection and transmission of plane electromagnetic waves, wave guides, retarded potentials, radiation, electrodynamics and relativity.
Prerequisites: junior standing and a grade of C or better in PHYSICS 420(P); or graduate standing.
Course Rules: Counts as repeat of 2 cr of PHYSICS 421.
Last Taught: Spring 2025.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 441 Introduction to Quantum Mechanics I
4 cr. Undergraduate/Graduate.
Historical background and experimental basis, De Broglie waves, correspondence principle, uncertainty principle, Schroedinger equation; hydrogen atom, electron spin, Pauli Principle, applications of wave mechanics.
Prerequisites: junior standing, PHYSICS 309(NP), and MATH 325(C); or graduate standing.
Last Taught: Fall 2025.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 441G Introduction to Quantum Mechanics I
4 cr. Undergraduate/Graduate.
Historical background and experimental basis, De Broglie waves, correspondence principle, uncertainty principle, Schroedinger equation; hydrogen atom, electron spin, Pauli Principle, applications of wave mechanics.
Prerequisites: junior standing, PHYSICS 309(NP), and MATH 325(C); or graduate standing.
Last Taught: Fall 2025.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 442 Introduction to Quantum Mechanics II
3 cr. Undergraduate/Graduate.
Continuation of PHYSICS 441, emphasizing perturbation theory and applications to multi-electron systems, including atoms, molecules, and solids.
Prerequisites: junior standing and a grade of C or better in PHYSICS 441(NP); or graduate standing.
Last Taught: Spring 2025.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 442G Introduction to Quantum Mechanics II
3 cr. Undergraduate/Graduate.
Continuation of PHYSICS 441, emphasizing perturbation theory and applications to multi-electron systems, including atoms, molecules, and solids.
Prerequisites: junior standing and a grade of C or better in PHYSICS 441(NP); or graduate standing.
Last Taught: Spring 2025.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 489 Internship in Physics, Upper Division
1-6 cr. Undergraduate.
Application of advanced principles of physics in a research, business, organizational, educational, political, or other appropriate setting.
Prerequisites: junior standing; 300-level or above course in physics; 2.25 GPA and consent of supervising faculty member.
Course Rules: One cr earned for academic work based on 40 hrs in internship. May be retaken to 6 cr max.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 497 Study Abroad:
1-12 cr. Undergraduate/Graduate.
Designed to enroll students in UWM sponsored program before course work level, content, and credits are determined and/or in specially prepared program course work.
Prerequisites: junior standing and acceptance for Study Abroad Program.
Course Rules: May be retaken with change in topic.
Last Taught: Fall 2014, Spring 1998.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 497G Study Abroad:
1-12 cr. Undergraduate/Graduate.
Designed to enroll students in UWM sponsored program before course work level, content, and credits are determined and/or in specially prepared program course work.
Prerequisites: junior standing and acceptance for Study Abroad Program.
Course Rules: May be retaken with change in topic.
Last Taught: Fall 2014, Spring 1998.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 498 Undergraduate Physics Seminar
1 cr. Undergraduate.
Talks by faculty, visitors, and students on topics of current interest in physics, astronomy, and other science and engineering fields.
Prerequisites: senior standing, and PHYSICS 411(C), PHYSICS 421(C), or PHYSICS 441(C).
Course Rules: Credit/no credit only.
Last Taught: Fall 2010, Spring 2010, Fall 2009, Spring 2009.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 499 Ad Hoc:
1-6 cr. Undergraduate.
Course created expressly for offering in a specified enrollment period. Requires department and associate dean approval. In exceptional circumstances, can be offered in one additional semester.
Prerequisites: junior standing; additional prerequisites may be assigned to specific topic.
Course Rules: May be retaken with change in topic.
Last Taught: Spring 2013, Spring 2011, Spring 2007, Spring 2004.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 501 Special Topics: Mathematical Models of Physical Problems I
3 cr. Undergraduate/Graduate.
Selected topics in mathematics for study of the techniques and procedures for stating physical problems in mathematical terms and the physical interpretation of mathematical solutions.
Prerequisites: junior standing, PHYSICS 210(P), and MATH 234(P).
Last Taught: Fall 2025, Fall 2024.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 501G Special Topics: Mathematical Models of Physical Problems I
3 cr. Undergraduate/Graduate.
Selected topics in mathematics for study of the techniques and procedures for stating physical problems in mathematical terms and the physical interpretation of mathematical solutions.
Prerequisites: junior standing, PHYSICS 210(P), and MATH 234(P).
Last Taught: Fall 2025, Fall 2024.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 502 Special Topics: Mathematical Models of Physical Problems II
3 cr. Undergraduate/Graduate.
More selected topics in mathematical models.
Prerequisites: junior standing, PHYSICS 210(P), and MATH 234(P). PHYSICS 501(R).
Last Taught: Spring 2007, Spring 2006.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 502G Special Topics: Mathematical Models of Physical Problems II
3 cr. Undergraduate/Graduate.
More selected topics in mathematical models.
Prerequisites: junior standing, PHYSICS 210(P), and MATH 234(P). PHYSICS 501(R).
Last Taught: Spring 2007, Spring 2006.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 515 Statistical Mechanics
3 cr. Undergraduate/Graduate.
Brief survey of thermodynamics; statistical mechanics; classical and quantum gases.
Prerequisites: junior standing, PHYSICS 317(P) and PHYSICS 441(P).
Last Taught: Fall 2025.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 515G Statistical Mechanics
3 cr. Undergraduate/Graduate.
Brief survey of thermodynamics; statistical mechanics; classical and quantum gases.
Prerequisites: junior standing, PHYSICS 317(P) and PHYSICS 441(P).
Last Taught: Fall 2025.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 517 Special Relativity
3 cr. Undergraduate/Graduate.
Relativistic kinematics, the Lorentz transformation, tensor calculus, applications to motion of particles, electromagnetism.
Prerequisites: junior standing. PHYSICS 411 and PHYSICS 421 recommended.
Last Taught: Fall 2017, Fall 2014.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 517G Special Relativity
3 cr. Undergraduate/Graduate.
Relativistic kinematics, the Lorentz transformation, tensor calculus, applications to motion of particles, electromagnetism.
Prerequisites: junior standing. PHYSICS 411 and PHYSICS 421 recommended.
Last Taught: Fall 2017, Fall 2014.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 531 Principles of Quantum Mechanics I
3 cr. Undergraduate/Graduate.
Vector and Hilbert spaces; Schroedinger equation in 1, 2, and 3 dimensions; systems of many particles; symmetries; angular momentum.
Prerequisites: junior standing and PHYSICS 441(P).
Last Taught: Fall 2025, Fall 2024.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 531G Principles of Quantum Mechanics I
3 cr. Undergraduate/Graduate.
Vector and Hilbert spaces; Schroedinger equation in 1, 2, and 3 dimensions; systems of many particles; symmetries; angular momentum.
Prerequisites: junior standing and PHYSICS 441(P).
Last Taught: Fall 2025, Fall 2024.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 532 Principles of Quantum Mechanics II
3 cr. Undergraduate/Graduate.
Continuation of PHYSICS 531. Spin; hydrogen atom; variational methods; WKB approximation; perturbation theory; scattering theory; Dirac equation.
Prerequisites: junior standing and PHYSICS 531(P).
Last Taught: Spring 2025, Spring 2024.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 532G Principles of Quantum Mechanics II
3 cr. Undergraduate/Graduate.
Continuation of PHYSICS 531. Spin; hydrogen atom; variational methods; WKB approximation; perturbation theory; scattering theory; Dirac equation.
Prerequisites: junior standing and PHYSICS 531(P).
Last Taught: Spring 2025, Spring 2024.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 541 Elementary Particles
3 cr. Undergraduate/Graduate.
Accelerators and detectors; special unitary groups; quark model of hadrons; Feynman diagrams; electromagnetic, weak and strong interactions of quarks and leptons; Higgs boson.
Prerequisites: junior standing and PHYSICS 441(P).
Last Taught: Fall 2011, Fall 2009.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 541G Elementary Particles
3 cr. Undergraduate/Graduate.
Accelerators and detectors; special unitary groups; quark model of hadrons; Feynman diagrams; electromagnetic, weak and strong interactions of quarks and leptons; Higgs boson.
Prerequisites: junior standing and PHYSICS 441(P).
Last Taught: Fall 2011, Fall 2009.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 551 Introduction to Solid State Physics I
3 cr. Undergraduate/Graduate.
Crystal structure, reciprocal lattice; crystal binding; elastic waves; phonons, lattice vibrations; thermal properties of insulators; free electron Fermi gas. Band structure; semiconductor crystals; Fermi surface.
Prerequisites: junior standing and PHYSICS 441(P); or consent of instructor.
Last Taught: Fall 2020, Fall 2018.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 551G Introduction to Solid State Physics I
3 cr. Undergraduate/Graduate.
Crystal structure, reciprocal lattice; crystal binding; elastic waves; phonons, lattice vibrations; thermal properties of insulators; free electron Fermi gas. Band structure; semiconductor crystals; Fermi surface.
Prerequisites: junior standing and PHYSICS 441(P); or consent of instructor.
Last Taught: Fall 2020, Fall 2018.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 575 Vacuum Science and Technology
3 cr. Undergraduate/Graduate.
Viscous and molecular flow, vacuum materials and seals, metal-to-ceramic seals, evaporation and vapor pressures, vacuum pumps, vacuum gauges, mass spectrographs, chemical reactions at surfaces, outgassing.
Prerequisites: junior standing and PHYSICS 441(P).
Last Taught: Spring 2011, Fall 2003.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 575G Vacuum Science and Technology
3 cr. Undergraduate/Graduate.
Viscous and molecular flow, vacuum materials and seals, metal-to-ceramic seals, evaporation and vapor pressures, vacuum pumps, vacuum gauges, mass spectrographs, chemical reactions at surfaces, outgassing.
Prerequisites: junior standing and PHYSICS 441(P).
Last Taught: Spring 2011, Fall 2003.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 606 Molecular, Cellular, and System Biophysics
3 cr. Undergraduate.
Cell structure and the molecular basis of life. Molecular and cellular interactions. Supracellular organization, signaling, and communication. Selfsimilarity and cooperativity.
Prerequisites: junior standing, PHYSICS 210(P), and consent of instructor; or graduate standing.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 610 The Art and Science of Teaching Physics
1 cr. Undergraduate/Graduate.
Participants critique lectures, videotapes of experienced teachers, each other; address conceptual problems facing beginning students; gain familiarity with demonstrations, classroom technology; discuss their own classes.
Prerequisites: undergraduate Teaching Assistant or graduate standing.
Last Taught: Fall 2025, Fall 2024.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 610G The Art and Science of Teaching Physics
1 cr. Undergraduate/Graduate.
Participants critique lectures, videotapes of experienced teachers, each other; address conceptual problems facing beginning students; gain familiarity with demonstrations, classroom technology; discuss their own classes.
Prerequisites: undergraduate Teaching Assistant or graduate standing.
Last Taught: Fall 2025, Fall 2024.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 651 Introduction to Solid State Physics II
3 cr. Undergraduate/Graduate.
Transport, superconductivity, dielectric properties, ferroelectric crystals, magnetism, magnetic resonance, optical phenomena in insulators, nanostructures, non-crystalline solids, point defects, alloys, dislocations.
Prerequisites: junior standing and PHYSICS 551(P).
Last Taught: Fall 2021, Spring 2019.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 651G Introduction to Solid State Physics II
3 cr. Undergraduate/Graduate.
Transport, superconductivity, dielectric properties, ferroelectric crystals, magnetism, magnetic resonance, optical phenomena in insulators, nanostructures, non-crystalline solids, point defects, alloys, dislocations.
Prerequisites: junior standing and PHYSICS 551(P).
Last Taught: Fall 2021, Spring 2019.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 670 Electron Microscopy Laboratory
3 cr. Undergraduate/Graduate.
Diffraction, imaging, and spectroscopy methods for study of morphology, crystallinity, and composition of solids in a transmission electron microscope.
Prerequisites: senior standing and PHYSICS 551(P); or consent of instructor.
Last Taught: Fall 2012, Fall 2009.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 670G Electron Microscopy Laboratory
3 cr. Undergraduate/Graduate.
Diffraction, imaging, and spectroscopy methods for study of morphology, crystallinity, and composition of solids in a transmission electron microscope.
Prerequisites: senior standing and PHYSICS 551(P); or consent of instructor.
Last Taught: Fall 2012, Fall 2009.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 698 Research Experience for Teachers
1-6 cr. Undergraduate/Graduate.
Enrichment of students' physics background. Work with faculty mentor to develop an innovative teaching program for use in students' own classroom.
Prerequisites: senior standing and current teaching contract.
Course Rules: Open only to practicing science teachers with demonstrable expertise in physics. May be retaken to 9 cr max.
Last Taught: Summer 2010, Summer 2009.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 698G Research Experience for Teachers
1-6 cr. Undergraduate/Graduate.
Enrichment of students' physics background. Work with faculty mentor to develop an innovative teaching program for use in students' own classroom.
Prerequisites: senior standing and current teaching contract.
Course Rules: Open only to practicing science teachers with demonstrable expertise in physics. May be retaken to 9 cr max.
Last Taught: Summer 2010, Summer 2009.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 699 Advanced Independent Reading
1-3 cr. Undergraduate.
Independent reading or research under supervision of faculty member. Study proposal required. For further information, consult dept chair or undergrad advising coord.
Prerequisites: junior standing, 2.0 GPA, and consent of instructor, department chair, and Assistant Dean for Student Academic Services.
Course Rules: May be retaken with change in topic to 6 cr max.
Last Taught: Summer 2018, Fall 2016, Summer 2015, Fall 2008.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 705 Molecular, Cellular, and System Biophysics
3 cr. Graduate.
Cell structure and the molecular basis for life. Molecular and cellular interactions. Supracellular organization, signalling, and communication. Self-similarity and cooperativity.
Prerequisites: grad st
Last Taught: Fall 2024, Spring 2022, Spring 2020, Fall 2017.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 706 Biophotonics
3 cr. Graduate.
Biophotonics and bioimaging; overview of application of optics in biology and medicine based on the understanding of basic optics, spectroscopy, and imaging theory.
Prerequisites: grad st
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 707 Structural Molecular Biophysics
3 cr. Graduate.
Methods in molecular biophysics.
Prerequisites: grad st; major in science-based discipline & Physics 210(P), or writ cons instr.
Last Taught: Fall 2025, Fall 2023, Fall 2021, Fall 2019.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 708 Experimental Techniques and Modeling Approaches in Biophysics
3 cr. Graduate.
Combined lectures about techniques in biophysics with statistical analysis, basic computer programming, and some lab work.
Prerequisites: graduate standing.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 711 Theoretical Physics-Dynamics
3 cr. Graduate.
Lagrange equations, canonical formulation, principle of least action, normal coordinates, rigid bodies, special relativity, mathematical methods.
Prerequisites: grad st; Math 321(C) or 322(C); or 701(C) or 702(C).
Last Taught: Spring 2025, Spring 2024, Spring 2023, Spring 2021.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 716 Advanced Topics in Statistical Physics
3 cr. Graduate.
Systems of interactir particles; critical phenomena; transport theory; irreversible processes and fluctuations; model calculations for interacting systems of particles.
Prerequisites: grad st; Physics 515(P), 532(P).
Last Taught: Spring 2016, Spring 2010, Spring 2008, Fall 1999.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 717 Gravitation
3 cr. Graduate.
General theory of relativity. Metric, covariant derivative, and curvature. Einstein field equations. Newtonian and weak-field limits. Gravitational waves. Experimental tests. Black holes and relativistic stars.
Prerequisites: grad st; Physics 517(P).
Last Taught: Fall 2025, Fall 2023, Fall 2020, Spring 2018.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 718 White Dwarfs, Neutron Stars, and Black Holes
3 cr. Graduate.
Physics of compact objects; newtonian and relativistic stellar structure and stability; pulsars, x-ray sources; accretion disks; gravitational collapse; stellar-size and supermassive black holes; quasars.
Prerequisites: grad st; Physics 717(P) or cons instr.
Last Taught: Spring 2021, Spring 2019, Spring 2017, Spring 2015.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 720 Electrodynamics I
3 cr. Graduate.
Maxwell's equations; Helmholz theorem; scalar and vector potentials; boundary value problems; plane wave solutions.
Prerequisites: grad st; Physics 711(P).
Last Taught: Spring 2024, Spring 2023, Spring 2021, Spring 2020.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 721 Electrodynamics II
3 cr. Graduate.
Wave guides, radiation by charges; radiation reaction; radiation scattering, damping and dispersion; covariant formulation of electrodynamics.
Prerequisites: grad st; Physics 720(P).
Last Taught: Fall 2021, Fall 2020, Fall 2019, Fall 2018.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 722 Advanced Classical Electromagnetism
3 cr. Graduate.
Selected topics in advanced classical electromagnetism: special relativity; covariant formulation of electrodynamics; radiation and radiative processes; electrodynamics in media; electro- and magnetostatics; electromagnetism as a gauge theory.
Prerequisites: graduate standing.
Last Taught: Spring 2025.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 731 Quantum Mechanics
3 cr. Graduate.
Mathematical formalism of quantum mechanics. Obserables and transformation theory, scattering perturbation, other approximation methods.
Prerequisites: grad st; Physics 532(P) & 711(P).
Last Taught: Fall 2004, Fall 2002, Fall 1998, Fall 1993.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 735 High Energy Physics
3 cr. Graduate.
Special relativity applied to high energy collisions, experimental techniques, ionization and radiation at high energy, weak interactions theory, II-meson and strange particle interactions, ultra-high energy phenomena.
Prerequisites: grad st & Physics 732(P).
Last Taught: Fall 2011.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 751 Solid State Theory I
3 cr. Graduate.
Phonons, plasmons, magnons, fermion fields and the hartree-fock approximation, and electron many-body techniques and the electron gas.
Prerequisites: grad st; Physics 531(P) & Physics 651(P).
Last Taught: Fall 2024, Spring 2018, Fall 2015, Fall 2013.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 752 Solid State Theory II
3 cr. Graduate.
Dynamics of electrons in a magnetic field: energy bands, cyclotron resonance, impurity states, optical absorption and excitons in semiconductor crystals; electrodynamics of metals; green's functions.
Prerequisites: grad st & Physics 532(P) & 751(P).
Last Taught: Spring 2014, Spring 2008, Spring 2006, Spring 2002.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 770 Electron Microscopy
3 cr. Graduate.
Kinematical and dynamical theory of electron diffraction. Transfer function theory of imaging. Electron and x-ray spectroscopies. Applications to surfaces and interfaces.
Prerequisites: grad st; Physics 551(P) or cons instr.
Last Taught: Fall 2011, Spring 2002.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 775 Surface Physics I
3 cr. Graduate.
Survey of experimental techniques in surface physics research.
Prerequisites: grad st; Physics 515(P) & 575(P).
Last Taught: Spring 2016, Spring 2012, Fall 2008, Fall 2002.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 781 Medical Radiation Physics
3 cr. Graduate.
Physical principles of the generation, interaction, detection, and measurement of radiation in medical applications; basics of radiation protection.
Prerequisites: grad st
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 782 Physics of Medical Imaging
3 cr. Graduate.
Basic theoretical knowledge of the physics of diagnostic radiology using x-rays, magnetic resonance, nuclear medicine, and ultrasounds.
Prerequisites: grad st
Last Taught: Spring 2021, Spring 2010, Spring 2008.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 784 Radiotherapy Physics
3 cr. Graduate.
Radiation physics for work as a hospital physicist, including accelerators for radiation therapy, quality characteristics of treatment beams, treatment planning, treatment techniques, quality assurance, oncology.
Prerequisites: grad st
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 786 Medical Physics Practicum
3 cr. Graduate.
Training with clinical medical imaging and therapy equipment, and dosimetry instrumentation.
Prerequisites: grad st; Physics 781(P)
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 801 Special Topics in Theoretical Physics:
2-3 cr. Graduate.
Discussion of recent research or advanced special topics.
Prerequisites: graduate standing and consent of instructor.
Course Rules: Retakable with change in topic to 9 credits max.
Last Taught: Fall 2025, Fall 2021, Fall 2016, Spring 2015.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 807 Group Theory and Its Applications to Physics
3 cr. Graduate.
Representations of discrete and continuous groups, including rotation groups, unitary groups and crystal point and space groups. Symmetries of elementary particles. Molecular obitals, energy bands.
Prerequisites: grad st; Physics 532(P).
Course Rules: Counts as repeat of Math 807.
Last Taught: Spring 2021, Spring 2018, Spring 2013, Spring 2005.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 811 Nonlinear Dynamics and Chaos
3 cr. Graduate.
Iteration of maps, numerical integration, strange attractors in dissipative systems, fractal dimensions, multifractals, entropy. Chaos in hamiltonian systems, perturbation theory, kam theorem. Quantum choas.
Prerequisites: grad st; Physics 711(P).
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 817 Gravitation and Cosmology II
3 cr. Graduate.
Experimental tests in gravitation. Gravitational waves: generation, detection. Spinning black holes. Cosmology: idealised cosmologies; present state of the universe; nucleosynthesis; inflation; recent developments.
Prerequisites: grad st; Physics 717(P) or cons instr.
Last Taught: Spring 2022, Fall 2019, Spring 2018, Spring 2014.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 818 Advanced Topics in Gravitational Physics
3 cr. Graduate.
Topics depend on student interest. Initial value problem. Spinors and positive mass. Singularity theorems. Modern kaluza-klein theory. Approaches to quantum gravity.
Prerequisites: grad st; Physics 717(P).
Last Taught: Spring 2020, Spring 2016, Spring 2012, Spring 2008.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 831 Quantum Field Theory I
3 cr. Graduate.
Group theory, canonical and path integral quantization, feynman rules, quantum electrodynamics, renormalization, quantum chromodynamics, electroweak theory, spontaneous symmetry breaking.
Prerequisites: grad st; Physics 732(P).
Last Taught: Spring 2023, Fall 2017, Fall 2013, Spring 2000.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 852 Superconductivity
3 cr. Graduate.
Properties of type I and type II superconductors, bcs and ginzburg-landau theory, vortices, and flux dynamics.
Prerequisites: grad st; Physics 532(P) & 651(P).
Last Taught: Spring 2007.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 853 Superfluidity
3 cr. Graduate.
Bose-Einstein condensation. Properties of superfluid 4HE, 3HE and 3HE-4HE mixtures.
Prerequisites: grad st; Physics 551(P) & 651(P) or physics 515(P).
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 854 Electron Phonon Interaction
3 cr. Graduate.
Wave propagation in metals. Interaction of electrons with the lattice in normal metals, superconductors, and magnetic materials.
Prerequisites: grad st; Physics 532(P) & 651(P).
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 888 Candidate for Degree
0 cr. Graduate.
Available for graduate students who must meet minimum credit load requirement.
Prerequisites: graduate standing.
Course Rules: Fee for 1 cr assessed; unit does not count towards credit load for Fin Aid. Repeatable. Satisfactory/Unsatisfactory only.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 890 Master's Thesis
1-6 cr. Graduate.
Course for students completing supervised Master's Thesis.
Prerequisites: graduate standing and consent of instructor.
Course Rules: Repeatable to 12 cr max. Satisfactory/Unsatisfactory only. Credit(s) count toward Master's degree only if student completes thesis option.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 891 Master's Capstone Project
1-3 cr. Graduate.
Independent project supervised by student's advisor.
Prerequisites: graduate standing; consent of instructor and graduate program committee.
Course Rules: May not be taken for credit more than once.
Last Taught: Summer 2025.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 900 Colloquium
1 cr. Graduate.
Lectures by staff and visitors on research in various areas of physics.
Prerequisites: grad st.
Last Taught: Fall 2017, Fall 2014, Spring 2013, Spring 2012.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 903 Seminar in Theoretical Physics:
1-3 cr. Graduate.
Discussion of special topics of interest to research students in theoretical physics.Retakable w/chg in topic to 9 cr max. Prereq: grad st & cons instr.
Last Taught: Spring 2025, Fall 2024, Spring 2023, Fall 2022.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 904 Seminar in Surface Studies:
1-3 cr. Graduate.
Special topics in the chemistry and physics of surface studies. Specific topics and any additional prerequisites announced in Timetable each time course is offered.
Prerequisites: grad st; cons instr.
Course Rules: Retakable w/chg in topic to 9 cr max.
Last Taught: Spring 2017, Spring 2016, Spring 2015, Spring 2014.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 906 Seminar in Biophysics:
1-3 cr. Graduate.
Special topics in experimental biophysics. Retakable with change in topic to 9 cr max.
Prerequisites: grad st; cons instr.
Last Taught: Spring 2024, Spring 2021, Spring 2019, Fall 2018.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 990 Research
1-9 cr. Graduate.
Prerequisites: grad st & cons instr.
Last Taught: Fall 2025, Summer 2025, Spring 2025, Fall 2024.
Current Offerings: https://catalog.uwm.edu/course-search/

PHYSICS 999 Independent Reading
1-3 cr. Graduate.
For the benefit of graduate students unable to secure needed content in regular courses.
Prerequisites: grad st, cons instr.
Last Taught: Fall 2025, Fall 2023, Summer 2023, Spring 2023.
Current Offerings: https://catalog.uwm.edu/course-search/