Physics Course Descriptions

PHYSICS (PHYS)

PHYS-111. INTRODUCTION TO PHYSICS I 3:3:0

An introductory course in physics with emphasis on mechanics, sound, thermodynamics, optics, electricity, and magnetism. Three (3) lectures per week.

Prerequisites: MTSC-121, MTSC-122 or consent of the Department.

Credit, three hours each.

PHYS-111L. INTRODUCTION TO PHYSICS LABORATORY I 1:0:2

Laboratory section taken in association with PHYS-111 and PHYS-112. One (1) two-hour laboratory period per week.

Corequisites: PHYS-111, PHYS-112.

Credit, one hour each.

PHYS-112. INTRODUCTION TO PHYSICS II 3:3:0

An introductory course in physics with emphasis on mechanics, sound, thermodynamics, optics, electricity, and magnetism. Three (3) lectures per week.

Prerequisites: MTSC-121, MTSC-122 or consent of the Department.

Credit, three hours each.

PHYS-112L. INTRODUCTION TO PHYSICS LABORATORY II 1:0:2

Laboratory section taken in association with PHYS-111 and PHYS-112. One (1) two-hour laboratory period per week.

Corequisites: PHYS-111, PHYS-112.

Credit, one hour each.

PHYS-121. CONCEPTS OF PHYSICS I 3:2:2

Designed primarily for the non-science major. A descriptive treatment of the basic principles of classical physics. Motion, energy, properties of matter, and thermal physics are treated in a conceptual, largely non-mathematical format. There are no mathematics or science prerequisites. Two (2) lectures and one (1) two-hour laboratory period per week.

Credit, three hours.

PHYS-122. CONCEPTS OF PHYSICS II 3:2:2

Designed primarily for the non-Science major. A descriptive treatment of the basic principles of sound, electricity, magnetism, and optics is presented in a conceptual, largely non-mathematical, format. There are no mathematics or science prerequisites. Two (2) lectures and one (1) two-hour laboratory period per week.

Credit, three hours.

PHYS-123. CONCEPTS OF MODERN PHYSICS 3:2:2

A descriptive treatment of relativity, atomic structure, and nuclear physics primarily for the non-science major. In the laboratory period, selected topics of 20th century physics are investigated. There are no mathematics or science prerequisites. Two (2) lectures and one (1) two-hour laboratory period per week.

Credit, three hours.

PHYS-131. ENERGY 3:2:2

A course covering the scientific, technological, economic, political, and environmental factors associated with energy production and use. There are no mathematics or science prerequisites. Two (2) lectures and one (1) two-hour laboratory period per week.

Credit, three hours.

PHYS-141. SOUNDS AND ACOUSTICS 3:2:2

An introductory course for the non-Science major which investigates the principles underlying hi-fidelity sound reproduction equipment and techniques. Topics covered include speaker design, radio transmission, receiver and amplifier operation, and tape and CD function. There are no mathematics or science prerequisites. Two (2) lectures and one (1) two-hour laboratory each week.

Credit, three hours.

PHYS-191. UNIVERSITY SEMINAR I PHYSICS AND PRE-ENGINEERING 1:2:0

University Seminar is a two-semester, General Education course sequence designed to provide students with the essentials for a smooth transition to college life and academic success. Academic skills will be developed. These skills include critical reading, thinking, listening, writing, speaking, and using the library, the internet, and word processing. Values clarification, coping with peer pressures, and the impact of a healthy lifestyle will be addressed. Opportunities will be provided for self-evaluation and growth in basic learning strategies as well as personal and career goals. Knowing the history of the University, feeling connected to the institution, and sharing a common educational experience with other freshmen are important goals of this course. Students will also engage in analytical problem solving and learn about the process of science by designing investigations to answer scientific questions and implementing the use of technology to complete these investigations.

Credit, one hour.

PHYS-192. UNIVERSITY SEMINAR II PHYSICS AND PRE-ENGINEERING 1:1:0

University Seminar is a two-semester, General Education course sequence designed to provide students with the essentials for a smooth transition to college life and academic success. Academic skills will be developed. These skills include critical reading, thinking, listening, writing, speaking, and using the library, the internet, and word processing. Values clarification, coping with peer pressures, and the impact of a healthy lifestyle will be addressed. Opportunities will be provided for self-evaluation and growth in basic learning strategies as well as personal and career goals. Knowing the history of the University, feeling connected to the institution, and sharing a common educational experience with other freshmen are important goals of this course. Students will also engage in analytical problem solving and learn about the process of science by designing investigations to answer scientific questions and implementing the use of technology to complete these investigations.

Credit, one hour.

PHYS-201. GENERAL PHYSICS I 4:3:2

An elementary treatment of mechanics, wave motion, hydrostatics, sound, heat, light, electricity, and magnetism. Some calculus concepts are employed, and the problem method is largely used. Three (3) lectures and one (1) two-hour laboratory period per week.Co-requisites: MTSC-251

Credit, four hours each.

PHYS-202. GENERAL PHYSICS II 4:3:2

An elementary treatment of mechanics, wave motion, hydrostatics, sound, heat, light, electricity, and magnetism. Some calculus concepts are employed, and the problem method is largely used. Three (3) lectures and one (1) two-hour laboratory period per week.Pre-requisite: PHYS 201, Co-requisites: MTSC-252.

Credit, four hours each.

PHYS-211. FUNDAMENTALS OF PHYSICS I 4:3:2

A calculus based general physics sequence intended to meet the needs of students enrolled in all science, math, and technology programs (except physics and engineering majors). The sequence will address the fundamental concepts in linear and rotational mechanics, fluids, thermodynamics and kinetic theory, electric fields and circuits, magnetic fields, geometric and wave optics, and topics in modern physics. The following Strands and Goals of the General Education Program will be addressed by this course: Reading, Writing, Speaking, Listening, Across the Curriculum, Critical Thinking / Problem Solving, Computer and Information Technology, and Moral / Ethical Issues. Co-requisites: MTSC-251

Credit, four hours each.

PHYS-212. FUNDAMENTALS OF PHYSICS II 4:3:2

A calculus based general physics sequence intended to meet the needs of students enrolled in all science, math, and technology programs (except physics and engineering majors). The sequence will address the fundamental concepts in linear and rotational mechanics, fluids, thermodynamics and kinetic theory, electric fields and circuits, magnetic fields, geometric and wave optics, and topics in modern physics. The following Strands and Goals of the General Education Program will be addressed by this course: Reading, Writing, Speaking, Listening, Across the Curriculum, Critical Thinking / Problem Solving, Computer and Information Technology, and Moral / Ethical Issues. Pre-Requisite: PHYS 211

Credit, four hours each.

PHYS-220. SCIENTIFIC PROGRAMMING 3:3:0

An introduction to scientific software including program writing, data processing, and visualization. Software packages used for the class include C/C++, MATLAB, and Origin. Pre-Requisite: PHYS 201

Credit, three hours.

PHYS-250. RADIOISOTOPES 3:2:2

A lecture and laboratory course designed to provide a theoretical and practical knowledge of radioisotopes. The lecture topics include properties of radiation, nuclear reactions, health physics, and applications of radioisotopes in research and industry. In the laboratory, emphasis is placed on radiation detection, and measurement with appropriate safety precautions. Two (2) lectures and one (1) two-hour laboratory period per week.

Prerequisites: Completion of the Mathematics requirements under General Education.

Credit, three hours.

PHYS-261. ELECTRONICS FOR SCIENTISTS 3:1:4

The course includes the development of skills and understanding of basic principles of electronic instrumentations. Typical topics include the study and use of simple circuits and basic electronic devices like diodes and transistors, the measurement of

characteristics of electronic signals and the use of basic instrumentation like oscilloscopes, amplifiers, signal generators, power supplies, detectors and others for conducting concrete physical experiments. One (1) laboratory period. Prerequisites: MTSC-252, PHYS-202.

Credit, four hours.

PHYS-302. SIGNAL PROCESSING I 3:3:0

An introduction to both the theory and applications in signals and systems. Discrete and continuous time signals and systems, sampling, and conversion between analog and digital signals.Prerequisites: ENGR-212.

Credit, three hours.

PHYS-305. THERMAL PHYSICS 3:3:0

An intermediate course on the thermal phenomena involving gases and solids. The topics included are thermometry, calorimetry, specific heat, expansion, heat transfer, introductory kinetic theory, laws of thermodynamics, and applications. Three (3) lectures per week. Prerequisites: PHYS-251, MTSC-252, PHYS-201, PHYS-202.

Credit, three hours.

PHYS-306. COMPUTATIONAL METHODS OF PHYSICS 3:3:0

Development and computer-assisted analysis of mathematical models in chemistry, physics, and engineering. Typical topics include reaction rates, particle scattering, vibrating systems, least square analysis, and quantum chemistry. One (1) class period and two (2) computer laboratory periods. Prerequisites: MTSC-251, MTSC-252, PHYS-201, PHYS-202, PHYS 220

Credit, three hours.

PHYS-307. SOUND AND VIBRATION 3:2:2

An intermediate course in the fundamentals of periodic phenomena including wave motion in solid, liquid, and gaseous media, and introductory acoustics. Two (2) lectures and one (1) two-hour laboratory period per week. Prerequisites: MTSC-251, PHYS-201, PHYS-202.

Credit, three hours.

PHYS-310. OPTICAL ELECTRONICS 3:3:0

An overview of laser and optical systems with emphasis on optical beams and resonant laser cavities, characteristics of typical lasers (gas, solid state, and semiconductor), and application of optical devices. Prerequisites: PHYS-351.

Credit, three hours.

PHYS-311. FIBER OPTICS COMMUNICATIONS 4:3:2

The course enables students to gain theoretical and practical background in both physics and engineering aspects of fiber optic communications including the fundamental principle of light propagation in optical fibers and waveguides, the critical components of fiber optic networks, and fiber optical network systems. Prerequisites: PHYS-316.

Credit, four hours.

PHYS-313. ANALYTICAL MECHANICS I 3:3:0

An intermediate level sequence of courses addressing the mechanics of single particles, systems of particles, and rigid bodies. The

effects of forces and moments are investigated first through the equilibrium of structures and then through the study of dynamic systems. The conservation principles will be emphasized, and Lagrangian and Hamiltonian dynamics will be used to analyze a variety of mechanical systems. Four (4) lecture periods per week. Prerequisites: MTSC-251, MTSC-252, PHYS-201, PHYS-202.

Credit, four hours each.

PHYS-314. ANALYTICAL MECHANICS II 3:3:0

An intermediate level sequence of courses addressing the mechanics of single particles, systems of particles, and rigid bodies. The effects of forces and moments are investigated first through the equilibrium of structures and then through the study of dynamic systems. The conservation principles will be emphasized, and Lagrangian and Hamiltonian dynamics will be used to analyze a variety of mechanical systems. Four (4) lecture periods per week. Prerequisites: MTSC-251, MTSC-252, PHYS-201, PHYS-202.

Credit, four hours each.

PHYS-315. COMPUTER COMMUNICATIONS 3:3:0

An introduction, with an engineering emphasis, to the basic concepts of computer communication networks; network protocols, architecture, packet switching, LAN and WAN technologies, internet protocols, network performance, security, and management. Three (3) lectures per week. Prerequisites: PHYS-213.

Credit, three hours.

PHYS-316. INTRODUCTION TO OPTICS 4:3:2

An intermediate course in the fundamentals of physical optics. Topics included are theories of light, measurement of the speed of light, reflection, refraction, interference, diffraction, scattering, polarization, crystal optics, lasers and holography, optical instruments, and spectroscopy. Three (3) lectures and one (1) two-hour laboratory period per week. Prerequisites: MTSC-251, MTSC-252, MTSC-201, MTSC-202.

Credit, four hours.

PHYS-317. FOUNDATIONS OF BIOENGINEERING 3:3:0

An overview of the structure and function of biological molecules. The course covers in depth the physical aspects of human anatomy, molecular, and cellular biology.

Credit, three hours.

PHYS-331. MATHEMATICAL METHODS OF PHYSICS I 3:3:0

An intermediate course covering applied differential equations, vectors, matrices, Fourier series, Laplace transformations, and boundary value problems in general. Three (3) lectures per week. Prerequisites: MTSC-251, MTSC-252.

Credit, three hours.

PHYS-332. MATHEMATICAL METHODS OF PHYSICS II 3:3:0

An intermediate treatment of mathematical topics including complex variables, linear vector spaces, and integral transforms. Prerequisites: MTSC-251, MTSC-252.

Credit, three hours.

PHYS-351. APPLIED PHYSICS LAB I 3:1:4

An intermediate level course sequence in which applications of basic principles to laboratory systems are stressed. Areas treated include signal processing, electro-optical devices, and automated laboratory systems. One (1) lecture and two (2) two-hour laboratory sessions per week. Prerequisites: ENGR-205.

Credit, three hours.

PHYS-352. APPLIED PHYSICS LAB II 3:1:4

An intermediate level course sequence in which applications of basic principles to laboratory systems are stressed. Areas treated include signal processing, electro-optical devices, and automated laboratory systems. One (1) lecture and two (2) two-hour laboratory sessions per week. Prerequisites: ENGR-205.

Credit, three hours.

PHYS-361. MODERN PHYSICS 3:3:0

A course covering an introduction to the special theory of relativity, wave-particle duality, the quantum theory and their application to the study of the structure of atoms, and the atomic nuclei. Prerequisites: MTSC-251, MTSC-252, PHYS-201, PHYS-202.

Credit, three hours.

PHYS-362. QUANTUM MECHANICS 3:3:0

A course in the basic principles of quantum mechanics covering the Schrodinger equation, operators and transformation theory, angular momentum, atomic structure, and perturbation theory. Three (3) lectures per week.

Prerequisites: PHYS-313, PHYS-314, PHYS-361.

Credit, three hours.

PHYS-404. INTRODUCTION TO VLSI DESIGN 4:3:2

An introduction to the design and technology of very large scale integrated (VLSI) devices, circuits and systems including logic design fundamentals, graphics layout, clocking and timing, architecture, performance, limitations, packaging, and a required design project. Prerequisites: ENGR-309.

Credit, four hours.

PHYS-405. ELECTRONICS PHYSICS I 3:1:4

An intermediate course in applied electronics. One (1) lecture and two (2) two-hour laboratory periods per week.

Credit, three hours each.

PHYS-406. ELECTRONICS PHYSICS II 3:1:4

An intermediate course in applied electronics. One (1) lecture and two (2) two-hour laboratory periods per week.

Credit, three hours each.

PHYS-407. ADVANCED MODERN PHYSICS 4:3:2

New concepts of physics developed in the 20th century, namely quantum mechanics and relativity, are applied to study a variety of modern physics problems ranging from atomic and nuclear physics to molecular physics and nuclear physics. Three (3) lectures and one (1) two-hour laboratory period per week. Prerequisites: MTSC-251, MTSC-252, PHYS-201, PHYS-202, PHYS-361.

Credit, four hours.

PHYS-408. MODERN OPTICAL TECHNIQUES 3:3:0

The course enables students to gain both physics and engineering aspects of various modern optical imaging, sensing, and detection techniques. Focus is given to applications in industry, defense and security, and life science.

Prerequisites: PHYS-316.

Credit, three hours.

PHYS-409. BIOSENSORS AND BIOINSTRUMENTATION 4:3:2

Origins and characteristics of bioelectric signals, recording electrodes, biopotential amplifiers, basic sensors, chemical, pressure, sound, and flow transducers, noninvasive monitoring techniques, and electrical safety. Prerequisites: PHYS-317.

Credit, four hours.

PHYS-410. MOLECULAR ENGINEERING SYSTEMS 4:3:2

An overview of engineering biology with an emphasis on molecular systems. Topics include DNA nanotechnology, cell cloning, and gene therapy. Prerequisites: PHYS-317.

Credit, four hours.

PHYS-411. THEORY OF ELECTRICITY AND MAGNETISM I 3:3:0

An intermediate course in the theory of electricity and magnetism. Topics include electrostatics, electrodynamics, dielectric theory, magnetic properties of matter, and Maxwell‘s Equations. Three (3) lectures and one (1) two-hour laboratory period per week. Prerequisites: MTSC-251, MTSC-252, PHYS-313, PHYS-314 or equivalent.

Credit, three hours each.

PHYS-412. THEORY OF ELECTRICITY AND MAGNETISM II 3:3:0

An intermediate course in the theory of electricity and magnetism. Topics include electrostatics, electrodynamics, dielectric theory, magnetic properties of matter, and Maxwell‘s Equations. Three (3) lectures and one (1) two-hour laboratory period per week. Co-requisites: Prerequisites: MTSC-251, MTSC-252, PHYS-313, PHYS-314 or equivalent.

Credit, three hours each.

PHYS-413. INTRODUCTION TO LASER PHYSICS 4:3:2

The course will develop understanding of the basic principles as well as the theory of different types of lasers. The topics will include fundamentals of quantum electronics, oscillator model, rate equations, stimulated transitions, population inversion, laser amplification, design of laser resonators, principles of Q-switching, mode locking, injection locking, and modern applications of lasers. Three (3) lectures and one (1) two-hour laboratory period per week.

Prerequisites: MTSC-251, MTSC-252, PHYS-316, PHYS-361, and consent of the Instructor.

Credit, four hours.

PHYS-418. THEORETICAL AND EXPERIMENTAL RESEARCH 3:1:4

A laboratory course for senior Physics majors covering selected topics on intermediate and advanced levels. One (1) lecture and two (2) two-hour laboratory periods per week. Prerequisites: Consent of the Department.

Credit, three hours.

PHYS-421. INTRODUCTION TO SOLID STATE PHYSICS 3:3:0

A study of the fundamental properties of metals, semiconductors, and insulators: crystal structure, lattice vibrations and electron theory of metals and semiconductors. Prerequisites: MTSC-251, MTSC-252, PHYS-201, PHYS-202.

Credit, three hours.

PHYS-423. INTRODUCTION TO NONLINEAR OPTICS 4:3:2

The course will develop an understanding of the basic principles of light matter interaction and develop the fundamental concepts of various nonlinear optical processes in different type of materials. The topics will include an anharmonic classical oscillator model for nonlinear susceptibility, quantum mechanical treatment of nonlinear susceptibility, resonant and nonresonant nonlinearities, nonlinearities due to molecular orientation, optical phase conjugation, bistability, spontaneous and stimulated light scattering, and photorefractive phenomena and their applications.

Prerequisites: MTSC-251, MTSC-252, PHYS-316, PHYS-361, PHYS-362, and consent of the Instructor.

Credit, four hours.

PHYS-441. SELECTED TOPICS IN PHYSICS I 3:3:0

An intermediate course covering subjects related to current developments in physics.

Prerequisites: Consent of the Department.

Three credit hours

PHYS-442. SELECTED TOPICS IN PHYSICS II 3:3:0

An intermediate course covering subjects related to current developments in physics.

Prerequisites: Consent of the Department.

Credit, three hours each.

PHYS-451. INTRODUCTION TO RESEARCH 3:3:0

This course is an independent study course dealing with current research methodologies in physics.

Prerequisites: PHYS-201, PHYS-202

Credit, three hours.

PHYS-452. RESEARCH ETHICS 3:3:0

A discussion of the moral values, the attitudes and habits acceptable in research, and as exemplified in the process of the acquisition of scientific data, their analysis, and dissemination.

Credit, three hours.

ENGINEERING (ENGR)

ENGR-105. PROGRAMMING FOR ELECTRICAL ENGINEERS 3:3:0

Introduction to the computer language C/C++ and its use to solve elementary engineering problems using structured and object-oriented programming. Three (3) lectures per week.

Credit, three hours.

ENGR-106. PROGRAMMING FOR ENGINEERS 3:3:0

Introduction to the computer language FORTRAN 90 and its use to solve elementary engineering problems. Three (3) lectures per week.

Credit, three hours.

ENGR-107. GENERAL GEOLOGY FOR ENGINEERS 4:4:0

The nature of the Earth and of the processes that shape it: the Earth‘s external and internal energy, minerals and rocks, external processes and the evolution of the landscape, internal processes and the structure of the Earth, the Earth compared with other planets, sources of materials, and energy.

Credit, four hours.

ENGR-132. ENGINEERING GRAPHICS AND ANALYSIS 3:0:5

Fundamental concepts of multi-view projection drawing and application of drawing conventions. Includes sectional views, dimensioning, pictorial representation, fastener specifications, and drawings for various engineering disciplines. Computer applications include data structure for computer modeling, plotting routines for computer drawing, and an introduction to CAD principles. Five (5) hours laboratory per week.

Credit, three hours.

ENGR-202. INTRODUCTION TO DIGITAL SYSTEMS 4:3:1

A unified overview of the interrelationship among the digital representation and processing of information, the analysis and design of combinational and sequential digital networks, and the application of stored program information processors. Three (3) lectures and one (1) two-hour laboratory period per week. Prerequisites: PHYS-202.

Credit, four hours.

ENGR-205. ANALOG CIRCUITS I 4:3:3

Laws of the electric circuit, analysis of DC and AC circuits, network equations, and network theorems. Three (3) lectures and one (1) three-hour laboratory period per week. Prerequisites: MTSC-351, PHYS-202.

Credit, four hours.

ENGR-210. INTRODUCTION TO COMBINATIONAL LOGIC 2:2:2

Boolean algebra and its application to logic gates. Simplification of switching functions. Gate level logic design and design with MSI and LSI. Two (2) lectures and one (1) two-hour laboratory per week. Pre-Requisite: MTSC 121

Credit, three hours.

ENGR-211. INTRODUCTION TO SEQUENTIAL CIRCUITS 2:2:2

Analysis and design of synchronous, asynchronous systems, and algorithmic state machines. Two (2) lectures and one (1) two-hour laboratory per week. Prerequisites: ENGR-210.

Credit, three hours.

ENGR-212. SIGNALS AND SYSTEMS 4:3:1

An introduction to both theory and applications in signals and systems with applications drawn from communications, automatic control, filtering, audio, and image processing. Discrete and continuous time signals and systems, sampling, convolution, Fourier series and transforms, conversion between analog and digital signals. modulation, and Laplace and Z-transforms. Three (2) lectures and one (1) two-hour laboratory period per week. Prerequisites: MTSC-252.

Credit, four hours.

ENGR-220. MICROPROCESSOR-BASED SYSTEMS I 2:2:2

Introduction to small computing machines, architecture organization, and programming. One (1) lecture and one (1) two-hour laboratory per week. Prerequisites: ENGR-211 and consent of the Department.

Credit, two hours.

ENGR-221. MICROPROCESSOR-BASED SYSTEMS II 2:2:2

Extension of the concepts of Electrical Engineering 220 with emphasis on I/O, interrupt systems, and interfacing. One (1) lecture and one (1) two-hour laboratory per week. Prerequisites: ENGR-220.

Credit, two hours.

ENGR-225. LOGICAL DESIGN OF DIGITAL CIRCUITS 3:3:0

The logical properties of circuits based on two (2) valued devices; analysis and synthesis of combinational networks, optimization of combinational nets; sequential system organization and optimization; arithmetic algorithms, and languages for describing the behavior of automata. Prerequisites: ENGR-202.

Credit, three hours.

ENGR-270. INTRODUCTION TO DISCRETE SYSTEMS 3:3:0

An algorithmic, discrete signal approach to electrical systems. Topics include digital signal representation, digital filters, Z transforms, discrete Fourier systems, graphs, and flow network applied to electrical systems. Prerequisites: MTSC-252.

Credit, three hours.

ENGR-302. MATERIAL SCIENCE FOR ENGINEERS 4:3:3

Crystal binding and structure; energetic and structure of lattice defects; structures of inorganic and organic polymers; electronic and magnetic properties; elasticity, plasticity, and fracture; phase equilibria and transformations; reactions of structure, and treatment to properties. Three (3) one-hour lectures and one (1) three-hour laboratory per week.

Credit, four hours.

ENGR-309. ELECTRONIC CIRCUIT ANALYSIS 4:3:3

Introduction to the physical principle of solid-state electronic devices. Quantitative study of elementary circuits including biasing, linear power amplifiers, low-frequency small signal analysis, multiple transistor circuits, and feedback. Three (3) lectures and one (1) three-hour laboratory per week. Prerequisites: ENGR-205.

Credit, four hours.

ENGR-340. SOLID STATE ELECTRONICS 3:3:0

An introduction to basic semiconductor physics concepts and their application to the study of electronic and optoelectronic circuits. Applications to electronic and optoelectronic devices such as diodes, transistors, LED's detectors, photodiodes, and integrated circuits. Three (3) lectures per week. Prerequisites: MTSC-351.

Credit, three hours.

ASTRONOMY (ASTR)

ASTR-101. DESCRIPTIVE ASTRONOMY I 3:2:2

An introductory course designed primarily for the non-Science major. Topics include the motion of celestial bodies, historical development of astronomy, structure of solar system members, and stellar evolution. Two (2) lectures and one (1) two-hour laboratory per week.

Credit, three hours.

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