ENGINEERING SCIENCE (EGR)

EGR 1007 Exploring Engineering (1 Credit)
An experience on developing simple engineering applications and engineering design. Combines lectures, hands-on laboratories and projects. Typically offered: Summer.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%201007)

EGR 1010 Science and Technology: How Things Work (5 Credits)
In this course students will work in teams to explore scientific and engineering principles to discover the basic science and engineering behind core technologies. Students will also consider the interface between Christianity and applied science.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%201010)

EGR 1501 Computer Aided Design Applications for Engineers (1 Credit)
This course introduces the fundamentals needed to use Computer Aided Design programs including but not limited to parametric design of individual parts, working with assemblies, and creating animations.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%201501)

EGR 1502 Machining and Fabricating (1 Credit)
This course will instruct in the principles of manufacturing through a series of guided projects utilizing machine tools, metal cutting, welding, hand tools/hand held power tools, and precision measuring instruments. Instruction will include operation of common machine tools such as the drill press, engine lathe, milling machine, sheet metal fabrication tools, and welding. Emphasis will be placed on safe operation of tools, work planning, and part design for manufacturability. Students will gain experience in light technical drawing (Blueprints/GD&T) and common part layout (benchwork) operations in preparation for manufacturing.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%201502)

EGR 1503 Engineering Tools and Systems (1 Credit)
An overview of common tools and techniques used in the design, operation, and analysis of engineering, instrumentation, and manufacturing systems.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%201503)

EGR 2200 Engineering Probability and Statistics (3 Credits)
Introduces students to concepts of probability and statistics along with methodology for applying these to engineering applications.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%202200)

EGR 2930 Practicum (1-5 Credit)
Practicum for lower division students. Does not credit as technical elective for engineering majors.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%202930)

EGR 2950 Special Topics in Engineering (1-5 Credit)
A basic course introducing the study of special interest topics in engineering. Topics and credits may vary between offerings.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%202950)

EGR 2970 Research (1-5 Credit)
Special topics and research. Does not count as technical elective credits for engineering majors.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%202970)

EGR 3000 Principles of Professional Practice (1 Credit)
Seminar and group discussion on topics related to the development of professional skills to prepare students for an engineering career. Includes discussion of engineering and SPU's mission, leadership styles, workplace ethics, internship and resume preparation, interviewing skills development, and exploration of internship job opportunities. Typically offered: Autumn.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%203000)

EGR 3211 Acoustics (5 Credits)
Students are advised to complete EGR 3500 prior to taking this course. A first course for engineering and physics students in the field of Acoustics and Noise Control Engineering. This course will cultivate a foundational understanding of fundamental acoustical principles such as simple harmonic oscillators, lumped element analysis, sound fields in bounded and unbounded spaces, human response to noise, and environmental and safety issues. Applications will include Helmholtz resonators, loudspeaker enclosures, room acoustics, environmental noise, and HVAC noise and vibration control.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%203211)

EGR 3311 Experimental Methods I (3 Credits)
In this course students will be introduced to advanced methods, tools and cognitive tasks required for contemporary scientific investigation and experimental research. Students will participate collaboratively in the design and implementation of benchtop research projects in physics and related fields. Students will use computers for collecting, analyzing and modeling experimental data. Special emphasis will be given to strategies for constructing and testing quantitative models for physical phenomena.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%203311)

EGR 3312 Experimental Methods II (3 Credits)
In this course students will build on knowledge and skills developed in Experimental Methods I in order to gain greater ownership of the strategies required for autonomous experimental research. Students will participate collaboratively in the process of forming their own research questions and constructing a plan for investigating these questions. Students will use computers for collecting, analyzing and modeling experimental data.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%203312)

EGR 3313 Experimental Methods III (3 Credits)
In this course students will build on knowledge and skills developed in Experimental Methods I & II in order to take full ownership of an autonomous laboratory investigation. Students will participate collaboratively in the processes of: forming a focused research question, writing and refining a research proposal, constructing, testing, calibrating and modifying experimental apparatus, developing and executing data collection and analysis protocols, and synthesizing and presenting research findings.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%203313)

EGR 3611 Appropriate and Sustainable Engineering I: Alternative Energy Systems (5 Credits)
Introduces different energy sources and investigates methods to convert this energy into a useful form. Energy sources that are investigated, designed, built and tested include solar, wind, hydropower, and investigates issues of sustainability with the US energy sector. Includes examples of the use of each of these power sources. Typically offered: Autumn.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%203611)

EGR 3612 Appropriate and Sustainable Engineering II (4 Credits)
Advanced topics in appropriate and sustainable engineering, covering topics relevant to engineers focused on sustainable technologies with emphasis on the developing world.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%203612)

EGR 3614 Appropriate and Sustainable Engineering III (4 Credits)
Advanced topics in appropriate and sustainable engineering, covering topics relevant to engineers focused on sustainable technologies, with emphasis on applications for the developing world. Typically offered: Alternate Years, Spring.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%203614)

EGR 3630 Participatory Development in Appropriate Engineering (5 Credits)
Exploring How to Help Without Hurting - this interdisciplinary course is for global development, engineering, education, business, theology, and other students looking to gain practical experience interacting with real-world problems in resource-limited, global contexts, especially around themes of poverty alleviation and energy, water, health, and sanitation solutions. Students will explore case studies that illustrate common development pitfalls. Technical field techniques such as site-reconnaissance and community participation methods will be explored with an emphasis on data collection and analysis for needs assessment. Projects will involve interdisciplinary teams focused on off-grid project assessment and concept-design. Application to and approval for study abroad participation is required for sections that include travel. Typically offered: Summer.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%203630)

EGR 3800 Biomedical Engineering I (1-5 Credit)
Content varies by instructor but will include elements of an introduction to the history of biomedical engineering, biosensors, bioelectric phenomena, bioinstrumentation, biosignal processing, biomechanics, cardiovascular mechanics, prosthetics, cellular mechanics, and ultrasound. The course includes labs, readings, presentations and research papers.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%203800)

EGR 3810 General Engineering Design (5 Credits)
This course uses interdisciplinary team projects to illustrate how engineers develop technical solutions to address a problem/need of each team's mutual choosing. Each project requires the design, analysis, and/or selection of various mechanical and electrical elements to construct a functional prototype. Formal documentation via oral and written reports and project management tools are used throughout the process.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%203810)

EGR 4450 Control Systems Design (5 Credits)
Analog control system feedback analysis and design using root locus, frequency and PID methods to adjust stability and performance of the controlled systems. MATLAB is used extensively as a design tool. Typically offered: Winter.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%204450)

EGR 4610 Systems Design (4 Credits)
Provides an analysis and design of engineered systems as they relate to their appropriate application and environmental, economic, and societal sustainability. Students will use a systematic approach, including life cycle assessment, and explore impacts on society, including public policy.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%204610)

EGR 4615 Engineering Project Management (3 Credits)
An introduction to project management and team leadership in engineering organizations. Includes concepts on key documents such as work breakdown structures, schedules, budgets, and risk management plans. Learn to use computer based tools for managing projects and tracking project schedule, budgets, and risks. Develop and present project information for a comprehensive, collaborative project including project management ethics and professional standards.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%204615)

EGR 4811 Engineering Senior Design I (3 Credits)
Student teams begin a system level design of a project (a nondisclosure agreement may be required). Projects will be selected from a variety of topics. Students provide detailed schedules for building prototype systems and present periodic progress reports. During the course, students produce a technical specification, undergo several design reviews and design a prototype system. Typically Offered: Autumn.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%204811)

EGR 4812 Engineering Senior Design II (3 Credits)
Student teams continue to implement and refine the prototype design from the first senior design course. Teams write detailed technical reports and submit their designs to design reviews. Periodic progress reports and team presentations are required. Quarter culminates with delivery and demonstration of initial prototype which will be subsequently revised and tested in the third course. Typically offered: Winter.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%204812)

EGR 4899 Engineering Capstone and Senior Design (3 Credits)
In this capstone course, designs from EGR 4812 are developed into a manufacturing prototype and tested. The course covers testing methodology, redesign, and documentation methodology. Teams author detailed technical documents. Periodic progress reports and final presentations are required. Includes study of vocation in engineering, writing reflective responses, and preparation of a portfolio of major projects students have finished. Typically offered: Spring.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%204899)

EGR 4900 Independent Study in Engineering (1-5 Credit)
Student does an independent study under direction of a faculty member. Study of problems in a topic for which related courses have been completed.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%204900)

EGR 4930 Practicum - Service (1-5 Credit)
Practical experience in engineering that provides a service to the university and applies content learned from coursework. Examples include academic system support and programming; tutoring, grading and lab preparation.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%204930)

EGR 4931 Engineering Practicum (1-5 Credit)
Practical experience in applying engineering concepts outside of a typical course, such as conducting a hands-on projects at a company.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%204931)

EGR 4940 Engineering Internship (1-5 Credit)
Students work for an engineering employer and report on their experience. Arrangements must be made in advance. Typically offered: Summer.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%204940)

EGR 4941 Engineering Professional Experience (1 Credit)
Students report on their professional experiences (such as internship or certification) through written reports and presentations. Students will also consider post-graduation aspects of entering the profession. Note: A learning contract for a tech internship or professional experience must be approved before enrolling in EGR 4941 and must be completed before passing EGR 4941. Typically offered: Autumn, Winter, Spring.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%204941)

EGR 4950 Special Topics: General Engineering (1-5 Credit)
An advanced course studying a special interest topic in general engineering. Topics and credits may vary between offerings.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%204950)

EGR 4960 Senior Project (1-5 Credit)
Student works with faculty advisor on a mutually agreed upon project. Requires submission of application to EGR chair three weeks prior to the start of the quarter.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%204960)

EGR 4970 Research (1-5 Credit)
Special projects and research in the engineering department.
Course Schedule (https://catalog.spu.edu/course-search/?keyword=EGR%204970)