

SUSTAINABLE PRODUCT DESIGN & INNOVATION (SPDI)

IISPD-151 Product Design Principles (4 Credits)

Human-Centered Design: Product Design involves the interdisciplinary integration of human, ergonomic and aesthetic needs with technological and production methods to create manufactured products. Product Design Principles cover the human/object interface, product form, innovation, redesign, and eco-design. Research Product Cases with reflective writing. Sketching and hands-on projects emphasize design methods. Lecture/Lab. Not open to students who have taken SPDI-152 or IISPD-199 Product Design Essentials.

Offered: All, Every Year

IISPD-360 Sustainability by Design (4 Credits)

An interdisciplinary approach grounded in a comprehensive definition of sustainability to assist students exploring potential multidisciplinary or transdisciplinary solutions to complex, multi-layered problems - including but not limited to climate change, desertification, militarism, consumerism, wealth inequality and affordable housing, education and health care. Open to all majors.

Prerequisite(s): Take 24 credits of ISP, including ITW-101 and QL

Offered: All, Every Year

INSPDI-183 Ultra-Precision Manufacturing (4 Credits)

Explore the fascinating world of Ultra-Precision Manufacturing used to make optical systems and extremely-precise components for Advanced Research, Medical, Automotive, Communication and Aerospace applications. Learn this technology's evolution and role in our economy. Gain hands-on experience in modern diamond-turning, creating and measuring with ultra-precision while obtaining in-demand skills and knowledge.

Offered: Spring, Every Year

INSPDI-385 Bio-Fabrication (4 Credits)

Bio-printing uses 3D-printing to reproduce a 3D functional living tissue scaffold through the deposition of biomaterials along with high precision positioning of cells. You will learn about 3D bio-printing principles, biomaterials, and complex geometric modeling of body parts. Discover the current challenges, possible solutions and potentials of bio-fabrication. Previous CAD experience, Math and Chemistry are helpful.

Prerequisite(s): Take 24 credits in ISP including ITW-101 and QL

Offered: Spring, Every Year

SPDI-110 Electricity & Electronic Fundamentals (4 Credits)

An introductory course which examines topics from magnetism and electricity to electronics and microcomputers. A hands on, experiential learning environment is used to stimulate creativity and understanding of electronics in today's society. Two hour lecture, three hour lab.

Offered: All, Every Year

SPDI-121 Design Visualization in PD & Engineer (4 Credits)

Design Visualization in New Product Design, Development and Engineering is fundamental in bringing new ideas to life. Design Sketching, Engineering Drawing, Pictorial representations, modeling and Computer Aided Design (CAD) are explored using classic and contemporary methods to help develop your design and engineering processes. Lecture/Lab.

Offered: Fall, Every Year

SPDI-170 Introduction to Woodworking Technology (4 Credits)

Focus on woodworking systems in mass production applications and one of a kind manufacturing. Emphasis on problem solving and creativity in laboratory activities. Function, maintenance, safety, and use of tools, machinery, and materials including supportive theory. 2 hr lecture, 3 hr lab.

Offered: Fall, Every Year

SPDI-180 Metal Processes & Prototyping (4 Credits)

Deals with the processes involved with machining, casting and fabricating metal. Shop safety, proper use of hand and measuring tools, and the use of machine tools are covered. Valuable prototyping skills are covered. Two hour lecture, three hour lab.

Offered: All, Every Year

SPDI-221 Three Dimensional CADD (4 Credits)

Graphic representation of objects intended for manufacturing using three dimensional computer aided drafting software. Parametric solid modeling of parts and assemblies and creating orthographic view drawings uses SolidWorks software. Previous experience with Windows, Orthographic Drawing and 2D CAD is expected. SPDI-121 recommended prior to this course or permission of instructor.

Offered: All, Every Year

SPDI-290 Special Topics (1-4 Credits)

Study of a selected topic in the Sustainable Product Design and Innovation program. May be repeated as topics change. Prerequisites vary with topics.

Offered: All, Every Year

SPDI-294 Cooperative Education (1-4 Credits)

Introductory work learning experience related to career interests, for which compensation may be received. Positions arranged by students with sponsorship, approval and evaluation by full time faculty. Elective credit only (normally 120 hours/credit) to maximum of 12 credits per degree program. Graded Pass/Fail.

Prerequisite(s): 24 total credits earned, 2.0 cumulative GPA, and permission of instructor

Offered: All, Every Year

SPDI-298 Independent Study (1-4 Credits)

An opportunity for a qualified student to explore work in an area of individual interest, selected and pursued in consultation with a faculty member. Consent is required from the instructor who will supervise the independent study. May be repeated for a total of 4 credits.

SPDI-302 Properties of Materials (4 Credits)

Materials used in products are selected to perform under a wide array of conditions. This course provides a study and analysis of the structure, behavior, and properties of materials used in contemporary industry allowing for further study of the implications of material selection and geometry in design of engineered products.

Prerequisite(s): MATH-111 or MATH-112, or MATH-211, or permission of instructor

Offered: Spring, Every Year

SPDI-304 Materials - a Life Cycle View (4 Credits)

Materials chosen for use in products have important ramifications for the products performance and its impacts throughout its life cycle. Emphasis is on the properties and manufacturing processes informing the selection of materials converted to useful products. A material life cycle view provides transparency to human health and environmental effects. SPDI majors: SPDI-302 recommended prior or concurrent registration.

Offered: Spring, Every Year

SPDI-321 Advanced 3D CADD (4 Credits)

Parametric, solid modeling is used to create complex parts, surfaces and assemblies, in the context of problem solving and critical thinking to generate effective prototyping strategies. Applications using SolidWorks software include sheet metal parts, virtual stress analysis, design tables and parametric databases, ANSI and ISO standard engineering drawings and GD & T.

Prerequisite(s): SPDI-221

Offered: Spring, Every Year

SPDI-330 Metrology & CMM (2 Credits)

This course will focus on Metrology and the acquisition of knowledge and skills necessary to utilize Coordinate Measurement Machines (CMM) for the inspection of mechanical items. Emphasis is on accuracy and efficient programming, calibration, alignment structure, geometry feature disciplines, and CAD model use for the process of qualifying manufactured items. Also for individuals with prior industry experience in blueprint reading and inspection.

Prerequisite(s): SPDI-121 or SPDI-221, or permission of instructor

Offered: Spring, Every Year

SPDI-351 Product Design II (4 Credits)

A continuation of Product Design I, emphasis is on rational methods for developing designs in team settings. Basic engineering methods of analysis are introduced to evaluate design structures and mechanisms. Alternative design options are evaluated using analytical techniques. Project planning fundamentals of time and budget emulate industrial development practices.

Prerequisite(s): IISPD-151, SPDI-152 or IISPD-199; AND SPDI-121 or SPDI-221; AND SPDI-170 or SPDI-180; or permission of instructor

Offered: Fall, Every Year

SPDI-352 Product Design III (4 Credits)

This course is the third in the Product Design series. Specific design projects are undertaken which require an advanced knowledge of computer aided Design/Manufacturing. Topics include initial product design, product specifications, prototype fabrication, and evaluation. Two hour lecture, three hour lab. May be repeated once with permission of the instructor.

Prerequisite(s): SPDI-221 and SPDI-351

Offered: Spring, Every Year

SPDI-380 CAD/CAM/CNC Using MasterCAM (4 Credits)

Parts will be designed, programmed, and created using CAD and MasterCAM software and CNC mills. CNC machine set up and interface are covered. The class will consist of several projects over the semester including the creation of new programming. Two-hour lecture, three-hour lab.

Prerequisite(s): SPDI-180, and SPDI-121 or SPDI-221, or permission of instructor

Offered: Fall, Every Year

SPDI-400 Manufacturing Enterprise (4 Credits)

Organization and implementation of a student managed industrial enterprise, including a general overview of economic systems and corporate structure. Emphasizes laboratory covering design, production and distribution of marketable consumer products. Two hour lecture, three hour lab.

Prerequisite(s): Junior standing or above

Offered: Fall, Every Year

SPDI-410 Mechatronics and Automation (4 Credits)

Modern manufacturing technologies integrate mechanical and electrical components with computer controls in flexible, automated systems. This lab-based course includes methods for developing multi-station manufacturing and assembly systems using sensors, actuators, conveyors, robotics, vision systems, microprocessors, and other automation equipment used in manufacturing.

Prerequisite(s): SPDI-110 or PHYS-260

Offered: Fall, Every Year

SPDI-446 Competitive Manufacturing Management (4 Credits)

Processes utilized in today's agile and lean manufacturing organizations create tangible products optimizing value to the end consumer. Emphasis is focused in design, implementation, and control of manufacturing processes that are efficient, safe, and environmentally sustainable in the new era of fierce global competition and increasingly scarce natural resources. Cross-listed as: MGT-446. Prerequisites: MGT-101 and MGT-140.

Offered: Spring, Every Year

SPDI-450 Product DfMA (4 Credits)

Your product design project focuses on exploring, in an open-forum setting, the detail design processes to optimize manufacturability while considering associated cost drivers. Topics include material and process selection, part stress identification, and pricing model. SolidWorks proficiency is expected.

Prerequisite(s): SPDI-221 & SPDI-252, or industry experience and permission of instructor

Offered: Fall, Every Year

SPDI-456 Portfolio Design (2 Credits)

Develop a visual portfolio of your SPDI projects, other KSC experiences and your work and internship experiences to illustrate your knowledge and skills in preparation for career opportunities and/or graduate school applications. All graduating SPDI majors are expected to participate in the Spring Senior Portfolio Review.

Offered: Spring, Every Year

SPDI-490 Advance Special Topics (1-4 Credits)

Study of a selected topic in the Sustainable Product Design and Innovation program at an advanced level. May be repeated as topics change. Prerequisites vary with topics.

Offered: All, Every Year

SPDI-494 Advanced Cooperative Education (1-4 Credits)

Sequential work learning experience for which compensation may be received. Positions arranged by students with sponsorship, approval, and evaluation by full time faculty. Elective credit only (normally 120/hours credit) to maximum of 12 credits per program. May be repeated for credit. Graded Pass/Fail.

Prerequisite(s): SPDI-294, 2.0 cumulative GPA, declaration of major, and permission of instructor

Offered: All, Every Year

SPDI-495 Seminar (1-4 Credits)

Small group discussion of problems and issues in Sustainable Product Design and Innovation. May be repeated as topics change.

Offered: All, Every Year

SPDI-498 Independent Study (1-4 Credits)

Advanced independent study of various fields of Sustainable Product Design and Innovation through independent reading, writing, laboratory work, or field investigation. Requires written report. May be repeated for a total of 4 credits.

Prerequisite(s): Permission of instructor

Offered: All, Every Year