Industrial Design
School of Art, Design and Art History
All INDU courses are restricted to declared art, art history, graphic design, and interior design majors in art and art history during the fall and spring semesters. During May and summer sessions, INDU courses are open to all students who meet the additional stated course prerequisites. Non-majors wishing to enroll in an INDU course during the fall and spring semesters may request permission of the instructor.

INDU/ARC 220. CAD: 3D Modeling. 3 credits.
This course will introduce students to principles used in 3D Cad and BIM modeling. Technologies to draw three dimensionally on the computer will be considered as a discipline within itself, and students will be instructed to use the machine for design exploration. Various software packages will be utilized during the semester.

Indepetent activity, such as research or studio practice, under faculty supervision. Projected studies in any area of the school's offering must be arranged with the instructors who will direct them. Offered only with the consent of the instructor.

INDU 392. Topics in Industrial Design. 3 credits.
Study of selected topics in art, art history, graphic design, interior design, or industrial design at the intermediate level. May be repeated when course content changes. See MyMadison for current topics.

INDU 490. Independent Studies Industrial Design. 1-3 credits, repeatable.
Offering varies.
Independent activity, such as research or studio practice, under faculty supervision. Projected studies in any area of the school's offering must be arranged with the instructors who will direct them. Offered only with the consent of the instructor.

INDU 491. Studio Assistant. 1-3 credits, repeatable. Offering varies.
An on-campus program monitored on an individual basis designed to provide practical studio experience in the visual arts. Students will learn safe studio practices and management skills, including material use, inventory control and the proper operation of equipment found within various individual classroom studios. Prerequisites: Permission of the instructor.

INDU 492. Topics in Industrial Design. 3 credits. Offering varies.
Study of selected topics in industrial design at the advanced level. May be repeated when course content changes. See MyMadison for current topics.

INDU 496. Internship in Industrial Design. 1-8 credits.
An off-campus program prepared and monitored on an individual basis. Internships are designed to provide practical experience in the arts. Prerequisites: Permission of the instructor.

Integrated Science and Technology
Department of Integrated Science and Technology
First Year Student – Sophomore Sequence

ISAT 100. Environmental and Energy Sustainability. 3 credits.
This course explores scientific and technical issues important to environmental and energy sustainability. Students study fundamental chemistry and physics and then apply this knowledge to better understand air quality, water quality, and conventional and alternative energy processes. The class also explores the societal impacts of our energy choices and the potential impact we as individuals can have through personal initiative.

ISAT 101. ISAT Freshman Seminar. 1 credit.
This seminar course will introduce the ISAT curriculum and career options to freshmen students and will describe how various elements of the curriculum and available ISAT elective sequences in each technology sector relate to the goals and objectives of the program. Prerequisite: Freshman standing at JMU.

ISAT 112. Environmental Issues in Science and Technology (2, 2). 4 credits.
This course integrates the study of biology, chemistry and statistics within the context of environmental issues that include ozone depletion, acid rain, global warming, waste management and biodiversity.

ISAT 113. Biotechnology Issues in Science and Technology (2, 2). 4 credits.
This course introduces current topics in the life science technologies through lecture and laboratory exercises. Topics include advances in genetic engineering, the hierarchy of life and the rise of infectious diseases.

ISAT 131. Technology, Science and Society (1, 2). 3 credits.
This course introduces the social aspects of technology and science. It covers social science methods and related philosophical and ethical analyses. Students learn how the practice of science relates to the human-built world and why critical evaluations of science and technology policies are important.

ISAT 150. Algebra Essentials. 1 credit.
This course provides review and practice in algebra concepts that are needed to successfully complete ISAT 151. Various mathematical models, including trigonometric, are also reviewed. The course is designed for students who possess a basic understanding of algebra but are not proficient in its application. Prerequisite: Permission of instructor. Corequisite: ISAT 151 and permission of instructor.

ISAT 151. Topics in Applied Calculus in ISAT. 4 credits.
This course introduces the concepts of differential and integral calculus and ordinary differential equations to model real-world applications in science, business, technology and economics. This course includes a computer laboratory component emphasizing modeling and numerical methods. Course assumes familiarity with algebra and trigonometry.

ISAT 151L. Analytical Methods I: Applied Calculus Laboratory. 1 credit.
This course is the computer laboratory portion of ISAT 151. Topics in Applied Calculus in ISAT. It is intended for students who already have AP credit or calculus lecture credit. Students will use numerical methods to solve mathematical modeling and calculus problems with Microsoft Excel. Students will study linear, polynomial, exponential, logarithmic, S-curve and trigonometric models in business and the physical and natural sciences. Prerequisites: Permission of instructor or academic unit head required.

ISAT 152. Topics in Applied Physics in Integrated Science and Technology. 4 credits.
This course introduces topics in general physics including one- and two-dimensional motion, mechanics, energy, waves, electricity, magnetism, optics, lasers, and early quantum theory. Vectors, algebra, and differential and integral calculus, are used to model physical system behavior. Laboratory experiments and computer exercises enhance understanding of the concepts. Prerequisites: ISAT 151 or permission of instructor.

ISAT 156/BIO 203. Viral Discovery. 1 credit.
This course is an exploratory laboratory experience, designed for incoming freshmen. In the course, the students will learn about the life cycle and ecology of viruses infecting bacteria. Soil samples will be collected, and techniques for isolation and purification of the viruses will be performed by the students. Isolated viruses will be visualized using electron microscopy. The genomic material will be isolated and prepared for nucleic acid sequencing.

ISAT 166/BIO 204. Viral Genome and Bioinformatics. 2 credits.
This is a computer-based laboratory experience, designed for those students completing the Viral Discovery course. Students will learn how to identify genes in a viral genome, compare the predicted proteins with known proteins in databases, describe the contents of the genome, and annotate all the relevant information for publication. Students will also research the ecology of soil and the role played by bacteriophages in ecology and evolution. Prerequisites: ISAT 165 or BIO 203.

ISAT 180. Topics in Integrated Science and Technology. 1-4 credits.
Special topics in integrated science and technology which are of interest to the entry-level student. May be repeated for credit when course content changes. Students should consult the instructor prior to enrolling for the course. Prerequisite: Permission of instructor.