

## **ARTS 2300**

### **A Be Creative course**

General catalog title, **Hand Drawing Bicycles for Designers and Engineers**

Semester Hours, **3sch**

#### General Catalog Description

**For designers and engineers drafting and drawing go hand in hand, in ways critically required. While working exclusively in digital drawing is the norm, a person who can draw ideas by hand does perhaps have a fuller understanding of the object and project. Students will do drawings of bicycles, bicycle components, and bicycles in locations, learning hand drafting, using drawing tools including pen, pencil, and marker. With the bicycle as context, students will learn: iterative drawing, sketching diagrams, loose orthogonal drawings, measured two-dimensional and three-dimensional drawing, perspective, isometric study and basic drawing skills (line, contour, cross-contour, value, volume, texture, color theory).**

#### **“Why a bicycle as focus?”**

A critical design process can only be accomplished with hand drawing. The bicycle is an excellent context drawing. This a Be Creative Course and could also serve as a primer and technical introduction for students enrolling in Fabrication and Design: Handmade Bicycle.

The basic design of a bicycle, consisting of two wheels connected by a frame with pedals and handlebars, has remained virtually unchanged since its invention in the 19th century. The fundamental principles behind bicycle engineering are timeless. The balance between stability and maneuverability, achieved through the placement of wheels and center of gravity, remains optimal in its original form. Bicycle design and engineering might be understood as the one of the best examples of iterative design and engineering. To draw a bicycle and bicycle components is to investigate the history of the bicycle and with this understand the iterative processes of design and engineering. (In 2017 a bicycle I designed, engineered and built received a top award at Bespoked, the international handmade bicycle show. The award recognized a purposeful iteration of bicycle design for use in deep snow.)

Purposeful creation and the pursuit of idiosyncratic ideas leads to more complete experimentation with concepts and skills. For this course the creation of bicycles is the purposeful context for learning hand drawing and drafting. The iterative nature of bicycle design and engineering is one of the most complete examples of the importance of knowing how to hand draw. The course will use two historical books illustrating the iterative nature of bicycle design and engineering from velocipede to a contemporary “fat bike”. Every Cyclist's Handbook by F. J. Camm, 1936, includes 199 pages of drawings of bicycles, bicycle components, bicycle tools and bicycle repair. This is a great companion book to The Data Book, published in 1983 by Mr. Nogushi, president of the Joto Ringyo company. The Data Book has hand drawings of 1935 prototypes of derailleur designs, 100-year old suspension forks, an automatic gear system from 1924, hydraulic brakes from the 1950s.

#### **“Why draw and draft by hand?”**

Considering that many design students arrive at Iowa as undergraduate or graduate students with knowledge of digital drawing technologies like Photoshop and AutoCAD (which is used in the bicycle design and fabrication courses), asking why you need to learn how to draft and draw by hand seems a fair enough question. The answer: To successfully develop responsive design and engineering solutions designers and engineers must challenge existing ideas through an iterative process and when the visual and spatial complexities of a project or detail are unclear, we rely on a person's capacity to quickly create a hand drawing for the iterative process. This hand drawing visually communicates the idea in an instant to other designers, artists, contractors, or clients.

For designers and engineers drafting and drawing go hand in hand, in ways sometimes not appreciated, but nevertheless critically required. Hand drawing includes sketching diagrams, loose orthogonal drawings, and perspectives and are created with pen, pencil, or marker. Hand drafting is the process of creating a measured two-dimensional or three-dimensional drawing in perspective, isometric, plan, elevation, or section. Because of the nature of drafting, these drawings tend to be less intuitive and more precise than hand drawings. The process of hand drafting requires more understanding of what you are drawing before you begin the drawing, and drafted drawings are built out from hand drawing, sketching. The amount of information needed to understand a project before beginning a new computer drawing can be paralyzing, especially if formal ideas have not been resolved through hand drawing or hand drafting. While working exclusively in digital drawing is the norm, a person who can draw ideas by hand does perhaps have a fuller understanding of the object and project.

It is also critical to know and to learn how to use hand tools if you are going to be an engineer or designer.

*The Handmade Bicycle curriculum at the University of Iowa, known as Design, Build, Ride, is a testament to the creativity and craftsmanship of students. Design, Build, Ride allows students to design and build their own bicycles, showcasing their skills and passion for design and engineering. The three courses that make up the curriculum are, TDSN:3285:0001, Fabrication & Design: Hand-Built Bicycle; MTLs:4960:0001, Project Design: Handmade Bicycle II; MTLs:4970:0001, Project Design: Handmade Bicycle III*

*The Handmade Bicycle courses at the University of Iowa showcase both technical expertise and artistic expression of Art and Engineering majors. The courses serve as a reminder that innovation can be found with unexpected curricular projects on university campuses, and with using your hands. Students produce beautiful bicycles and the courses cultivate a sense of interdisciplinarity across majors.*

