

Civil Engineering: Structural and Environmental

Overview

What is Civil Engineering? According to the Board of Direction of the American Society of Civil Engineers (ASCE), who officially defined the field in 1961, civil engineering is “the profession in which a knowledge of the mathematical and physical sciences gained by study, experience, and practice is applied with judgment to develop ways to utilize, economically, the materials and forces of nature for the progressive well-being of humanity in creating, improving and protecting the environment, in providing facilities for community living, industry and transportation, and in providing structures for the use of humanity.” (quotation from *Civil Engineering Body of Knowledge for the 21st Century: Preparing the Civil Engineer for the Future*)

Basically, civil engineers use their knowledge of math, physics, biology, technology, mechanics and materials to make the world liveable for everybody. To practice engineering requires a strong grasp of science and design, problem-solving ability, and a willingness to embrace innovation.

Writing for Engineers

In learning about the skills of communication necessary to becoming a working engineer, I have been much indebted to *Civil Engineering Body of Knowledge for the 21st Century: Preparing the Civil Engineer for the Future*. This publication of the American Society of Civil Engineers lays out what bases of knowledge are expected of up-and-coming civil engineers, at what levels of education they are expected to form these bases of knowledge, and what knowledge they can expect to be assessed on by the Accreditation Board for Engineering and Technology, or ABET.

Through explanation of the 24 outcomes to be fulfilled by certified engineers, we see which skills of communication are crucial to the practice.

According to Outcome 13: Project Management, competent civil engineers are expected to be able to 1. list key management principles, 2. explain what a project is and the key aspects of project management, 3. develop solutions to well-defined project management problems, and 4. formulate documents to be incorporated into the project plan.

According to Outcome 16: Communication, competent civil engineers must have the ability to 1. list the characteristics of effective verbal, written, virtual and graphical communications, 2. describe the characteristics of effective verbal, written, virtual and graphical communications, 3. apply the rules of grammar and composition in verbal and written communications, properly cite sources, and use appropriate graphical standards in preparing engineering drawings, 4. organize and deliver effective verbal, written, virtual, and graphical communications, 5. plan, compose, and integrate the verbal, written, virtual, and graphical communication of a project to technical and non-technical audiences.

Three common genres in engineering

The academic article is the stock and trade of any engineer working in academia, though they may also be produced by engineers working in the field. The article is a narrative record of the work the engineer has produced, new discoveries that have made or conclusions that have been drawn based on research or experimentation in the engineer's particular field.

The proposal is a basic genre of technical communication. It is almost wholly indicated by the presence of a particular audience and a particular purpose. The proposal in engineering exists to introduce a project and seek permission, provide justification, or request funding.

Specifications are unique to certain types of engineering and industry—they can best be described as categorized lists of the necessary equipment, tools, and services required to complete an engineered task as proposed. The basic function of the specification is to communicate needs between organizations, or even different branches of the same organization—for example, firms in which engineers design new types of machinery but have no hand in the construction of the machinery.

Talking with Engineers

Dr. Dario Gasparini

Field: Structural Engineering

Work: Structures; Wind and earthquake engineering, Case Western Reserve University, Cleveland, OH

Views on writing: Dr. Gasparini holds his students' writing to a high standard of correctness, but he is not as concerned with form. The most important elements are clarity of ideas, particularly technical information, and attention to the cultural significance of those ideas.

Dr. Aaron Jennings

Field: Environmental Engineering

Work: Soil quality; Technological implications in environmental engineering, Case Western Reserve University, Cleveland, OH

Views on writing: Dr. Jennings thinks that the importance of writing in the engineering profession can't be underestimated. He would like to see his students recognizing the importance of structure and form as much as he would like to see them following those rules.

Rebecca Dugopolski

Field: Environmental Engineering

Work: Storm water quality and management, Herrera Environmental Consultants, Inc., Seattle, WA

Views on writing: Rebecca thinks a 'writing for engineers' class is a good idea; she was never required to take one. At her firm, engineers get by working from templates, by modeling from old reports kept on file, and constant collaboration through reviews by peers as well as superiors.

Professional Organizations

American Society of Civil Engineers

American Architectural Foundation

American Concrete Institute

American Institute of Steel Construction

Association of Engineering Geologists

Association of Iron and Steel Engineers

Earthquake Engineering Research Institute

Environmental & Engineering Geophysical Society

Environmental & Water Resources Institute

Geological Society of America

Materials Information Society

Seismological Society of America

National Society of Black Engineers

Society of Hispanic Professional Engineers

Asian American Architects & Engineers Association

Society of Women Engineers

Professional Journals

Civil Engineering and Environmental Systems

Civil Engineering Bulletin

Environmental Engineering

Environmental Engineering and Management Journal

Environmental Engineering and Policy

Journal of Environmental Engineering

Journal of Materials in Civil Engineering

Journal of Materials Research

Journal of Materials Science

Journal of Structural Engineering

Progress in Structural Engineering and Materials

Structural and Multidisciplinary Optimization

Structural Control and Health Monitoring