

(5) WRITTEN EXAMINATIONS FOR ENGINEER-IN-TRAINING AND PROFESSIONAL ENGINEER. (a) *Examinations required.* 1. For certification as engineer-in-training—fundamentals examination. Total 1 day (8 hours).

2. For registration as professional engineer.

a. If certified as engineer-in-training—principles and practice examination. Total 1 day (8 hours).

b. If not certified as engineer-in-training—fundamentals examination and principles and practice examination. Total 2 days (16 hours).

(b) *Place and time of examinations.* The examinations will be held at sites and on dates designated by the board.

(c) *Grading of written examinations, passing grades and retakes.* Experience ratings will not be weighed as a part of the examinations.

(d) *Scope of written examinations.* 1. Fundamentals examination—requires an understanding of the physical and mathematical sciences involved in the fundamentals of engineering.

2. Principles and practice examination—requires ability to apply engineering principles and judgment to problems in general engineering fields such as chemical, civil, electrical and mechanical fields. Questions involving economic analysis and the design needs of people with physical disabilities and relevant statutes and codes will be included.

(e) *Requirements for entrance to examinations.* To be eligible to take the examination sections on fundamentals of engineering and principles and practice of engineering, an applicant shall have 4 years of qualifying engineering work experience or a combination of academic credit or engineering work experience which totals 4 years. Applicants who have obtained senior standing in an educational program of study of at least 4 years which leads to a baccalaureate degree in engineering or engineering technology are eligible to take the examination sections.

(6) EXAMINATIONS FOR LAND SURVEYORS. (a) Satisfactory completion of 2 examinations is required for registration as a land surveyor. The 2 examinations are: "Fundamentals of Land Surveying" (1 day, 8 hours) and "Principles and Practice" (1 day, 8 hours).

(b) *Place of examinations.* The examinations will be held at sites designated by the board.

(c) *Time of examinations.* To be arranged.

(d) *Grading of written examinations, passing grades.* 1. Experience ratings will not be weighed as part of the examinations.

2. On each 8 hour examination the passing grade shall be at least 70%.

(e) *Scope of written examinations.* 1. Fundamentals of Land Surveying: Requires an understanding of mathematics, physics, surveying methods for measuring horizontal, vertical and angular values, topographic and photogrammetric mapping, notekeeping, property surveys, computations, descriptions and plats.

2. Principles and Practice: Requires ability to apply principles and judgment to problems involving the U.S. System of Public Land Surveys, Wisconsin plane coordinate surveys, the relocation of lost and

obliterated corners, the legal essentials of resurveys, disputed boundaries, defective deed descriptions, riparian rights, adverse possession, the Wisconsin statutes relative to land surveying including the preparation and filing of plats, the writing and interpreting of land descriptions, the technical essentials of land surveying and subdivision of lands including practical problems requiring a knowledge of the basic theory and fundamental concepts of field astronomy, geometry of curves, topography and photogrammetry.

(f) *Requirements for entrance to examinations.* 1. To be eligible to enter the "Fundamentals of Land Surveying" section of the examination, an applicant must have completed at least 2 years of a course in land surveying as defined in s. A-E 1.18, or at least 4 years of practice in land surveying, or a combination of work or training in a course in land surveying and practice in land surveying which totals at least 4 years.

2. To be eligible to enter the "Principles and Practice of Land Surveying" section of the examination, an applicant must have completed at least 2 years of an approved course in land surveying as defined in s. A-E 1.18 and at least 2 years of approved practice in land surveying, or at least 5 years of approved practice in land surveying, or a combination of at least 5 years of approved work or training in a course in land surveying and practice in land surveying.

(7) WRITTEN EXAMINATIONS FOR DESIGNER OF ENGINEERING SYSTEMS.

(a) *Scope of written examination.* 1. The written examination in each field shall include questions and problems applying to the following basic content areas:

- a. Basic mathematics, physics and mechanics;
- b. Materials and structures;
- c. Graphic techniques, including drafting and sketching, reading and interpreting blueprints and preparing specifications; and,
- d. Administrative code and other relevant Wisconsin laws.

2. The examination for a permit in the field of heating, ventilating and air conditioning systems requires an applicant to demonstrate competency in:

- a. User requirements for maintenance of temperature;
- b. Humidity and ventilation systems;
- c. Energy sources, including air, water, steam, gas, electricity and fossil fuel;
- d. Heating, ventilating and air conditioning systems, including ducted, piped, unitary, steam and hot water systems; and,
- e. Manual, electric and pneumatic control systems, including air distribution, heat transfer, energy conservation and air changing systems.

3. The examination for a permit in the field of plumbing systems requires an applicant to demonstrate competency in:

- a. User requirements for water supply, drainage and disposal, including private septic systems; and,

b. Gaseous distribution systems, including processing piping, oxygen, air and other gases, heating and utilities.

4. The examination for a permit in the field of electrical systems requires the applicant to demonstrate competency in:

a. User requirements for both primary and secondary distribution, illumination, controls and switches, and communication systems; and,

b. Power, including resistance heating, signals and motors.

5. The examination for a permit in the field of fire protection systems requires the applicant to demonstrate competency in:

a. User requirements, for fire protection of life and property, life safety requirements, methods of fire prevention, wet and dry standpipes, use of fire retardants and fire proof materials;

b. Suppression;

c. Fire characteristics;

d. Smoke; and,

e. Gases.

(b) *Place and time of examinations.* The examinations shall be conducted on a date and time specified by the board.

(c) *Grading of written examinations.* An applicant's experience rating is not considered by the board in grading the applicant's written examination.

(d) *Requirements for entrance to examinations.* To be eligible to enter a written examination for a permit as a designer of engineering systems, an applicant shall have 7 years of approved experience in specialized engineering design work, up to 4 years of which may be equivalent academic training or apprenticeship as provided in s. 443.07 (2), Stats.

History: 1-2-56; r. and recr. (3); am. (5)(e)3., Register, February, 1961, No. 62, eff. 3-1-61; cr. (6), Register, August, 1965, No. 116, eff. 11-1-65; r. and recr. (3)(a), Register, November, 1966, No. 131, eff. 12-1-66; r. and recr. (4)(d), eff. 7-1-67; and r. and recr. (6), eff. 8-1-67; Register, April, 1967, No. 136; am. (5)(d)2, (5)(f)2 and (6)(a)2, Register, July, 1968, No. 151, eff. 8-1-68; r. and recr. (5)(b) and (c) and (6)(b) and (c), Register, February, 1969, No. 158, eff. 3-1-69; am. (3), (6) (a) 2, and (7), Register, January, 1971, No. 181, eff. 2-1-71; r. and recr. (5), Register, September, 1971, No. 189, eff. 10-1-71; reprinted, Register, October, 1971, No. 190 to correct error; cr. (3), Register, May, 1972, No. 197, eff. 6-1-72; cr. (7), Register, December, 1972, No. 204, eff. 1-1-73; (4) (a), r. and recr. (4) (d), Register, March, 1973, No. 207, eff. 4-1-73; am. (4) (d) 1., Register, December, 1973, No. 216, eff. 1-1-74; r. and recr. (6) (a), (d) and (e), Register, July, 1974, No. 223, eff. 8-1-74; cr. (4) (e) and (f), Register, October, 1974, No. 226, eff. 11-1-74; am. (5) (d) 2, Register, November, 1975, No. 239, eff. 12-1-75; am. (4) (d) 2, Register, December, 1975, No. 240, eff. 1-1-76; emerg. r. and recr. (4), eff. 4-16-76; r. and recr. (4), Register, December, 1976, No. 252, eff. 1-1-77; am. (4)(a) and (c)1, Register, June, 1977, No. 258, eff. 7-1-77; r. (5)(c)2 and (7)(c)2, Register, August, 1978, No. 272, eff. 9-1-78; r. and recr. (4) (a) to (c), cr. (5) (e), (6) (f) and (7) (e), Register, February, 1980, No. 290, eff. 3-1-80; emerg. am. (4)(c), eff. 4-19-80; suspended, 4-27-80; emerg. cr. (4)(e), eff. 7-2-80; am. (4)(c) and cr. (4) (e), Register, April, 1981, No. 304, eff. 5-1-81; reprinted to correct a printing error in (4) (d), Register, September, 1981, No. 309; am. (4) (a) and (7) (e), Register, January, 1982, No. 313, eff. 2-1-82; am. (5) (e), Register, July, 1982, No. 319, eff. 8-1-82; r. and recr. (4), Register, June, 1983, No. 330, eff. 7-1-83; r. and recr. (3), Register, July, 1984, No. 343, eff. 8-1-84; r. and recr. (7), Register, April, 1985, No. 352, eff. 5-1-85.

A-E 1.16 Education as an experience equivalent for registration as a professional engineer. (1) For the purpose of meeting experience requirements for registration as a professional engineer, an applicant may claim

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certain education as equivalent to experience in engineering as provided in s. 443.04 (2), Stats. The engineers' section grants an experience equivalent for education according to the table shown in (2).

(2) Table of Education and Experience Equivalents.

<u>Education</u>	<u>Experience Equivalent with Degree</u>	<u>Experience Equivalent for Each Year of Education Without Degree</u>
B.S. Engineering (ABET accredited)	4 years	1 year
B.S. Engineering (Not accredited by ABET)	3½ years	¾ year
B.S. Engineering Technology (ABET accredited)	3 years	¾ year
B.S. Engineering Related Sciences (e.g. Physics, Chemistry, Math, etc.)	3 years	¾ year
B.S. Engineering Technology (non-ABET accredited)	Not more than 2½ years	¾ year
Other B.S. Degrees	Not more than 2 years	½ year
Engineering Experience in ob- taining M.S. in Engineering	1 year	N/A
Engineering Experience in ob- taining Ph.D. in Engineering or Engineering Related Programs	1 year	N/A

History: Cr. Register, December, 1976, No. 252, eff. 1-1-77; am. (1), Register, January, 1982, No. 313, eff. 2-1-82; am. (2), Register, June, 1983, No. 330, eff. 7-1-83; am. (2), Register, March, 1984, No. 339, eff. 4-1-84.

A-E 1.17 Engineering experience. To qualify as satisfactory experience in engineering work for the purpose of meeting requirements of s. 443.04, Stats., an applicant's experience shall include the application of engineering principles and data and shall demonstrate an applicant's competence to do engineering work. This experience shall be acquired in the areas of engineering practice listed below or in other areas of engineering practice or academic course work which in the opinion of the board provides the applicant with a knowledge of engineering principles and data at least equivalent to that which would be acquired by experience in the areas of practice listed. An applicant need not acquire experience in all areas listed.

(1) **RESEARCH AND DEVELOPMENT.** (a) Problem identification, including consideration of alternative approaches to problem solving;

(b) Planning, including selecting a theoretical or experimental approach;

(c) Execution of plan, including completing design calculations;

(d) Interpreting and reporting results, including:

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1. Evaluating project feasibility studies,
2. Analyzing research and development data,
3. Producing interpretive reports,
4. Formulating conclusions and recommendations, and
5. Producing final reports.

(2) DESIGN. (a) Problem identification, including:

1. Identifying design objectives,
2. Identifying possible design concepts or methods,
3. Selecting methods to be employed in consideration of aesthetics, cost, and reliability,
4. Defining performance specifications and functional requirements, such as materials, energy balances and environmental considerations,
5. Formulating conceptual design specifications, and
6. Defining physical properties of all key materials.

(b) Planning, including defining safety health and environmental constraints.

(c) Execution of plan, including:

1. Developing design concepts,
2. Conducting feasibility studies,
3. Evaluating design and design methods,
4. Solving design problems,
5. Preparing designs, layouts and models,
6. Selecting materials and components,
7. Conducting value analysis of design,
8. Producing final designs,
9. Preparing supporting technical information,
10. Preparing detailed working drawings,
11. Preparing specifications and data sheets, and
12. Interacting with engineers from other areas of work, such as research and development and construction.

(d) Interpreting and reporting results, including:

1. Evaluating design for conformity to specifications,
2. Evaluating design solutions for efficiency, economic and technical feasibility and economic alternatives,
3. Evaluating design impact on public health, safety and welfare,
4. Evaluating design solution for adherence to laws and codes,

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5. Evaluating product liability risk,
6. Reviewing designs with clients or management, and
7. Preparing final reports.

(e) Implementation of results, including interacting with engineers from other disciplines of engineering.

(3) CONSTRUCTION. (a) Problem identification, including checking working drawings and specifications; and

(b) Execution of plan, including:

1. Consulting with designers, and
2. Identifying and requesting design changes.

(4) MANUFACTURING, PRODUCTION AND OPERATIONS. (a) Planning, including:

1. Proposing design or methods improvement, and
2. Planning operational processes and strategies.

(b) Execution of plan, including:

1. Preparing equipment, system and process specifications, and
2. Determining feasibility of new or improved products, systems and processes.

(c) Interpreting and reporting results, including preparing final reports.

(5) MAINTENANCE. (a) Problem identification, including determining causes of equipment, structures or schedule failures; and

(b) Interpreting and reporting results, including reporting the causes of equipment and structures failure.

(6) ADMINISTRATION AND MANAGEMENT, INCLUDING EXECUTION OF PLAN BY COMMUNICATING WITH OTHERS.

(7) OTHER ENGINEERING TASKS. (a) Conducting systems analysis or operations research; and

(b) Serving as a consultant or specialist to individual or business clients.

History: Cr. Register, December, 1976, No. 252, eff. 1-1-77; r. and recr. Register, July, 1982, No. 319, eff. 8-1-82.

A-E 1.175 Experience in Wisconsin. In addition to other experience requirements in this chapter, an applicant for registration as a professional engineer under s. 443.04 (1) (c), Stats., shall submit evidence that the applicant has had at least 6 months of engineering experience in Wisconsin or has had sufficient contacts with this state to make the applicant familiar with Wisconsin engineering law and practice.

History: Cr. Register, July, 1982, No. 319, eff. 8-1-82.

A-E 1.18 Educational requirements for land surveyors. To meet the educational requirements of s. 443.06 (2) (a), Stats., requiring "... a course Register, April, 1985, No. 352

in land surveying of not less than 2 years duration approved by the section . . ." an applicant for registration as a land surveyor shall have satisfactorily completed at least 60 semester credits in a civil engineering or land surveying curriculum including no less than 12 semester credits in land surveying which shall be in the following categories of study:

(1) No less than 8 of the 12 credits must be in courses concentrating on the legal principles of land surveying and the technical aspects of land surveying. These courses shall include such areas of study as the principles of evidence and the interpretation of written documents used in boundary determination, the study of the legal elements of land surveying including those involving resurveys, boundary disputes, defective descriptions, riparian rights and adverse possession, the study of the professional and judicial functions of a land surveyor, the study of surveying methods for measuring distance and angular values, note keeping, computation and writing descriptions and the study of the Wisconsin Statutes and local ordinances relating to the preparation of subdivision maps and plats.

(2) No more than 4 credits may be in courses related to land surveying such as "Engineering Surveying", "Municipal Surveying", "Route Surveying", "Highway Surveying", "Topographic Surveying", "Geodetic Surveying", "Photogrammetry", "Cartography", "Construction Surveying", "Air Photo Interpretation" and "Artillery Surveying".

History: Cr. Register, July, 1975, No. 235, eff. 8-1-75; am. Register, December, 1976, No. 252, eff. 1-1-77; am. (intro.), Register, January, 1982, No. 313, eff. 2-1-82.

A-E 1.19 Experience requirements for land surveyors. In determining whether an applicant has met the experience qualifications required for registration, the land surveyors' section will consider work in all areas of land surveying, including, but not limited to, any of the following:

- (1) Relocation of lost and obliterated corners;
- (2) Subdivision of sections;
- (3) Resurveys;
- (4) Preparation and filing of certified survey maps and subdivision plats;
- (5) Writing and interpretations of land descriptions.
- (6) Experience in areas of work relating to land surveying such as those described in ss. A-E 1.18 (2) and 1.70 (5) providing that the applicant has at least one-half of the experience required for registration in areas of land surveying defined in s. 443.01 (8), Stats., such as areas described in subs. (1) through (5) above and s. A-E 1.70 (1) through (4).

History: Cr. Register, March, 1973, No. 207, eff. 4-1-73; cr. (6), Register, August, 1974, No. 224, eff. 9-1-74; r. and recr. (6), Register, December, 1976, No. 252, eff. 1-1-77; am. (6), Register, August, 1978, No. 272, eff. 9-1-78; am. (6), Register, January, 1982, No. 313, eff. 2-1-82.

A-E 1.195 Evidence of education, training and experience to accompany land surveyor applications. (1) To be considered by the examining board, an applicant's submittal of an application showing education, training, and experience must include, as a minimum, the following:

- (a) Transcripts verifying applicant's education;

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- (b) References from at least 3 individuals who shall have personal knowledge of the applicant's experience in land surveying;
- (c) A chronological history of the applicant's employment;
- (d) Additional data, exhibits or references showing the extent and quality of the applicant's experience in land surveying may be required by the section.

History: Cr. Register, June, 1977, No. 258, eff. 7-1-77.

A-E 1.20 Designer permits, limitations. (1) Permits for the design of engineering systems shall be issued in the following fields:

- (a) Heating, ventilation and air conditioning systems;
 - (b) Plumbing systems;
 - (c) Electrical systems;
 - (d) Fire protection systems; and
 - (e) Industrial systems.
- (3) Permit numbers shall designate the fields to which permits are restricted.
- (4) Designers are restricted to performing such design services, as defined in s. A-E 1.001 (2) of these rules, in those fields in which they hold a permit, except as those services are exempted by ss. 443.14 and 443.15, Stats.

(5) Evidence of education, training and experience. To be considered by the examining board, an applicant's evidence of education, training and experience must include, as a minimum, the following:

- (a) Transcripts or apprenticeship records verifying applicant's education and training;
- (b) References from at least 5 individuals, 3 of whom shall have personal knowledge of the applicant's work involving the preparation of plans and specifications;
- (c) A chronological history of the applicant's employment;
- (d) Additional data, exhibits or references showing the extent and quality of the applicant's technological experience may be required by the section.

History: Cr. Register, March, 1971, No. 183, eff. 4-1-71; cr. (4) and (5), Register, May, 1972, No. 197, eff. 6-1-72; r. (2), am. (3), (4), (5)(c) and (d), Register, June, 1977, No. 258, eff. 7-1-77; am. (4), Register, January, 1982, No. 313, eff. 2-1-82.

A-E 1.50 Fees. (1) **APPLICATION, EXAMINATION, CERTIFICATION AND RENEWAL FEES.** Fees for obtaining or renewing a license as an architect, professional engineer, designer or land surveyor are specified in s. 440.05, Stats.

(2) **MISCELLANEOUS FEES.** (a) The fee for obtaining a photocopy of any board record available to the public shall be 15¢ per page of material copied.

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(b) The fee for obtaining a certified copy of any board record available to the public shall be \$2 plus 15¢ per page of material copied.

(c) The fee for obtaining a certificate showing a particular person to be licensed, the date of issuance, and type and status of license or a certificate showing no record of issuing a license to a particular person shall be \$3.00.

Note: Written confirmation (not in the form of a certificate) that a person is or is not licensed will be made without charge.

History: Cr. Register, May, 1972, No. 197, eff. 7-1-72; am. Register, March, 1973, No. 207, eff. 4-1-73; am. Register, June, 1976, No. 246, eff. 7-1-76; r. and recr. (2), Register, December, 1976, No. 252, eff. 1-1-77; r. and recr. (1), r. (2), renum. (3) to be (2), r. (2)(c) and renum. (2)(d) to be (2)(c), Register, August, 1978, No. 272, eff. 9-1-78.

A-E 1.60 Denial of license. (1) **DENIAL.** An applicant for license issued under the provisions of ch. 443, Stats., shall be denied a license if the applicant does not meet the standards or requirements for licensure set forth in ch. 443, Stats., or rules promulgated thereunder and may be denied a license if the applicant has been disciplined by the licensing authority of another state or if the applicant is guilty of any of the grounds for discipline in s. 443.11, Stats.

(2) **NOTICE.** Upon denial of an application for a license under (1), the board shall notify the applicant, stating the reason for denial, and that the applicant has the right to a hearing if written request is filed with the board within 30 days after service of the notice of denial. Unless written request for hearing is made within the 30 day period, the applicant's right to a hearing is deemed waived.

(3) **SERVICE.** Service of the notice of denial may be made by mail addressed to the applicant at the latest address filed by the applicant in writing with the board. Service by mail is complete on the date of mailing.

(4) **HEARING.** If a hearing is requested by the applicant, the board shall conduct such hearing. Hearings under this section shall be conducted by one or more board members. Proceedings of the hearing shall be recorded by magnetic tape unless an alternative method for recording the proceedings is ordered by the board.

History: Cr. Register, June, 1976, No. 246, eff. 7-1-76; am. (1), Register, April, 1985, No. 352, eff. 5-1-85.

A-E 1.70 Examples of land surveying services. The term "land surveying" is defined in s. 443.01 (8), Stats. Specific examples of land surveying services within the statutory definition are set forth below. Examples of services not within the definition are listed in sub. (5).

(1) Services comprising the determination of the location of land boundaries and land boundary corners include, but are not limited to, the following services:

- (a) Retracement of property lines to determine length and bearing;
- (b) Reestablishing obliterated property lines;
- (c) Establishing, reestablishing or perpetuating survey monuments;
- (d) Preparing descriptions of real property from data acquired by field measurements.

(2) Preparation of maps showing the shape and area of tracts of land and their subdivisions into smaller tracts includes, but is not limited to, preparation of the following maps.

(a) Maps of sections or portions of sections or townships as established by the original public land survey and subdivisions of said sections in accordance with the manuals of surveying instructions by the federal government.

(b) Subdivision plats prepared in accordance with the Wisconsin Statutes or applicable local ordinances;

(c) Certified survey maps prepared in accordance with the Wisconsin Statutes or applicable local ordinances;

(d) Maps showing other divisions of land not controlled by statute or ordinance.

(3) Preparation of maps showing the layout of roads, streets and rights of way of same to give access to smaller tracts includes, but is not limited to, preparation of the following maps:

(a) Certified survey maps;

(b) Subdivision plats;

(c) Highway and railroad right-of-way maps.

(4) Preparation of official maps or tracts of land in this state includes, but is not limited to, preparation of the following maps:

(a) Surveys of existing parcels of land including retracement of original subdivisions of sections of land in the public land survey;

(b) Subdivision plats, certified survey maps and plats of other land divisions.

(5) "Land surveying services" do not include services such as:

(a) Construction staking for highways, roads, streets or similar projects within the boundaries of established rights of way;

(b) Topographic surveys;

(c) Control networks for aerial photography unless property lines are used for control;

(d) Building layout or construction surveys.

History: Cr. Register, August, 1978, No. 272, eff. 9-1-78; am. (intro.), Register, January, 1982, No. 313, eff. 2-1-82.