

**Education Requirement
for
Colorado Professional Land Surveyor Licensure
“In My Opinion”**

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I have been getting numerous inquiries about the educational requirements for licensure as a Professional Land Surveyor in Colorado. It has come to my attention from the rest of the PLSC Board of Directors that there are a lot of folks asking about this subject and a lot of confusion about what is involved.

For some background, in 2010, the Colorado Legislature enacted some amendments to the Professional Land Surveyor’s laws, one of which repealed the portion of the law for recognizing the 10 years of mentoring experience, in lieu of education, as one of the routes for eligibility for licensure. To accommodate those surveyors already in the pipeline who were working for licensure using the 10-year mentoring route, the law allowed the mentoring route to remain in effect until July 1, 2020 at which time it was repealed. As a result of that legislation, licensure now requires a certain amount of education for eligibility.

Also, within the last couple of years, the AES Board changed the application process for Land Surveyor Interns and Professional Land Surveyors.

Previously, one provided the AES Board with their education and work experience prior to being admitted to the Fundamentals of Surveying (FS) exam for the LSI enrollment. If the Board deemed the education and experience were sufficient to be enrolled, they granted permission to take the FS test. Upon passing the test, the Board would then enroll the individual as an LSI.

After becoming an LSI, one previously would then provide the AES Board with their education and work experience prior to being admitted to the PS exam and the State Specific exam, which were given in the same day. Again, if the Board deemed the education and experience were sufficient to be licensed as a PLS, they granted permission to take the PS exam and the State Specific exam. Upon passing the exams (both), the Board would then issue the applicant their PLS license.

Now, the individual provides his/her education and work experience to the National Council of Examiners for Engineering and Surveying (NCEES). The individual self-attests that they have the appropriate education and experience when applying to the NCEES to take the FS exam.

NCEES then gives the FS exam and notifies the applicant whether they passed the exam or not. If the applicant passes the FS exam, they then apply to the AES Board for enrollment as an LSI. Certain forms needed to be filled out and requests made to the NCEES to provide the Board with the education, work experience, and examination score on the FS exam on file with the NCEES as part of the application. If all criteria are met, the Board then enrolls the applicant as an LSI.

In a similar fashion, the applicant would continue to add to the education and work record file at NCEES. The individual again self-attests they have the appropriate education and experience when applying to the NCEES to take the PS exam.

NCEES gives the PS exam and notifies the applicant whether they passed or not. If the applicant passes the PS exam, they then apply to the AES Board to take the State Specific exam. If the Board deems the applicant is enrolled as an LSI, the education and work experience requirements for licensure are met, and the NCEES indicates the PS test was passed, the applicant is allowed to take the State Specific test. If the State Specific test is passed, the Board then licenses the applicant as a PLS.

However, apparently there are now numerous applicants that after passing the FS exam and/or the PS exam make their application with the Board, and the Board deems either the experience and/or the education is insufficient for their particular application and requires the applicant to further their efforts in the areas of experience and/or education prior to being enrolled as an LSI or prior to being admitted to the State Specific test for the PLS.

I have some students who have passed the FS and the PS exams from the NCEES who are now being told that they have not met the education or work experience to be enrolled as an LSI or admitted to the State Specific exam. Obviously, there is some consternation among those individuals who have been surveying for many years and passed their various examinations to be stymied in their efforts at the last step.

In addition to the changes discussed above, within the last year, there was a licensure portability act passed by the Colorado legislature. Although very little has really changed with our requirements, the changes in law resulted in a whole new numbering system of the statutes that apply to licensure as a PLS. That resulted in a whole new rewrite of the Board Rules to reference the updated CRS statute numbers and as a result, the AES Board Rules are all newly numbered, too. So, if you are used to looking in the older documents of CRS and Board Rules such as the excellent last edition Paul Bacus assembled for the PLSC in 2019, the numbers are all changed. Any feedback from the AES Board or staff will be referencing the current numbering system.

To get the current Colorado Revised Statutes on the web, see <https://leg.colorado.gov/colorado-revised-statutes> . When you get to the website, there is a “Click here to access the Colorado Revised Statutes hosted by LexisNexis” note that will take you to the complete CRS. CRS 12-120-310 details the eligibility for an LSI, and 12-120-311 et al details the qualifications for an LSI. CRS 12-120-312 details the eligibility for a PLS, and 12-120-313 et al details the qualifications for a PLS.

You can also access the current Board Rules on the web at <https://dpo.colorado.gov/AES> . Then navigate to Board Rules, and eventually to a screen with a revision effective date of 8/30/2020.

When you are pursuing either the LSI or PLS, be sure to download these sections and following them closely.

Although this article is primarily on the education side of the requirements, a few words on the experience side may be appropriate.

When one examines the language in the law and AES Board Rules, there is reference to progressive work experience and progressive work experience under the supervision of a PLS. It appears that the Board’s interpretation of progressive work experience also includes a variety of experience. As an example, they may only count so much of one’s construction surveying experience if that is all the applicant has been doing. As another example, although this was prior to the new laws, I have a friend who gained his experience in the San Juan Mountains retracing mining claims, town lots, and other types of surveying. But because the PLSS surveys in that area were suspended in 1892 due to fraudulent surveys, he had very little experience within the PLSS. He had to request a hearing before the Board to

demonstrate his knowledge of the PLSS prior to them granting him his license. Fortunately, they did, since he was my mentor in surveying as I was getting the requisite experience needed at the time I got licensed as a PLS.

While on the subject of the experience side of one's application, the following summary of what the CRS require for admission to either the FS exam or SP exam may be helpful:

Of course each of those sections in the CRS have a section on reciprocity for those enrolled or licensed in another state that meet the general equivalency of Colorado laws.

Beyond that, for FS exam leading toward LSI enrollment under CRS 12-120-311(2)(b), for those seeking enrollment by graduation and examination,

(I) The applicant graduated from a board-approved surveying or surveying technology curriculum that is at least four years. or

(II) The applicant has senior status in a board-approved surveying or surveying technology curriculum that is at least four year.

Note that there is no additional experience requirement under this section.

Under CRS 12-120-311(3)(b) for those seeking enrollment by education, experience, and examination,

(I) (A) Have graduated from high school or the equivalent; and

(B) Have a cumulative record of four years or more of progressive land surveying experience, of which a maximum of one year of educational credit may be substituted, or

(II) (A) Have graduated from a board-approved two-year surveying curriculum; and

(B) Have a cumulative record of two years or more of progressive land surveying experience.

For those seeking admission to the PS exam in route to the PLS license, the experience side of one's application is covered under 12-120-314 and varies depending on the educational route one is using to seek licensure. I'll list the experience portion of each of those routes parenthetically as I discuss the educational component later in this article.

Throughout this article, I will be emphasizing each of you being your own self advocate. This not only involves your application, but your career and education path you choose to reach that stage of application. Look at the experience you are getting. If it is all in one area, request of your supervisors to broaden your experience. If you are working with a company that specializes in one area and the company cannot comply with a request for a varied background or due to financial consideration (profits) does not have the time to provide you with varying experience, you may need to look elsewhere for that experience if you want to become licensed. I know this is rather harsh but read the law and Board Rules carefully and ensure you can meet all of the criteria. When filling out those forms about experience which will be sent to your PLS supervisors for verification, be sure to be complete and include the various areas of experience you have gained.

Now to the education question that started this article. Throughout the article I refer to what is required by Colorado law and AES Board Rules and then pointing out how our programs at WCCC/CMU meet or do not meet those requirements. There are also other schools throughout the United States and even foreign countries that may provide you with the appropriate education. However, the focus of this article is "in my opinion" what the law requires and what the Board Rules require.

Please recognize, only the Board can make the final determination whether you meet the criteria for enrollment as an LSI or licensure as a PLS or not.

In general, per Colorado Revised Statutes 12-120-313 et al, the state has 4 educational routes for eligibility for licensure as a PLS:

1. Have graduated from a board-approved surveying curriculum of four or more years. (and have two years of progressive land surveying experience under the supervision of a professional land surveyor.)
2. Have graduated from a non-board-approved surveying curriculum of four or more years. (and have four years of progressive land surveying experience of which at least two must be under the supervision of a professional land surveyor.)
3. Have graduated from a board-approved two-year surveying curriculum or from a four-year engineering curriculum that included surveying course work as specified by the board by rule. (and have six years of progressive land surveying experience of which four years shall have been under the supervision of a professional land surveyor.)
4. Have obtained a bachelor's degree in a non-surveying curriculum and completed surveying and other related course work, as specified by the board by rule. (and have six years of progressive land surveying experience of which four years shall have been under the supervision of a professional land surveyor.)

Each of these, of course, requires enrollment as an LSI and the progressive land surveying experience of various time frames and levels of supervision depending on the route chosen.

The details of these educational requirements are contained within the Board Rules.

Since I will be pointing out the connection with these Board Rules and our programs at WCCC/CMU, I must first introduce you to our WCCC programs.

WCCC offers two programs in Land Surveying and Geomatics: An Associates of Applied Science (AAS) in Land Surveying and Geomatics, and a Post Baccalaureate Certificate (PBC) in Land Surveying and Geomatics. For more details of these programs, you can find them on the web with following link:

<https://www.coloradomesa.edu/wccc/programs/land-surveying-geomatics.html> .

If you are looking for other schools that provide Land Surveying and Geomatics education, search the internet for their respective links for their programs.

Now to the Board Rules and the connections with the WCCC programs.

Under board rules 1.4G2 – Surveying Education:

- a. Board-Approved Surveying Degree of Four or More Years – refers to the accreditation of ABET/ANSAC or as otherwise approved by the Board.

We do not have a program in Colorado that meets these criteria. One would have to check with other states for such schools. There are several available.

- b. Board-Approved Two-Year Surveying Degree. For a curriculum to be defined as a “Board-approved two-year surveying curriculum” as specified in section 12-120-313(2)(b)(III)(A), C.R.S, the curriculum must contain all of the following:

- (1) A minimum of eleven semester hours, or the equivalent, consisting of college-level mathematics. Trigonometry, survey computations, statistics, and/or probability will count

toward this requirement. Business math, college geometry and college algebra will not count toward this requirement.

- (2) A minimum of twenty-four semester hours, or the equivalent, consisting of: basic surveying, boundary law, description writing, public land survey system, surveying sciences, surveying practice, ethics, and basic science courses.

The Board has approved our AAS in Land Surveying and Geomatics as meeting these requirements. We had a bi-annual review in October 2020 and the Board approved the curriculum unanimously.

- c. Board-approved Engineering Degree of Four or More Years. For a curriculum to be defined as a Board-approved engineering curriculum of four or more years as specified in section 12-120-313(2)(b)(III)(A), C.R.S. the curriculum must be a minimum of 120 semester hours, or the equivalent, and must contain or be supplemented with, the following course work:
 - (1) A minimum of eleven semester hours, or the equivalent, consisting of college-level mathematics. Trigonometry, survey computations, statistics, and/or probability will count toward this requirement. Business math, college geometry and college algebra will not count toward this requirement.
 - (2) A minimum of twenty-four semester hours, or the equivalent, consisting of: basic surveying, boundary law, description writing, public land survey system, surveying sciences, surveying practice, ethics, and basic science courses.

Our Post Baccalaureate Certificate program is designed to meet these supplemental courses unless they were already contained in the specific engineering curriculum. If any were part of the engineering curriculum that meet the criteria such as calculus courses or perhaps a surveying course, these will be transferred over and made a part of the completed requirements for the PBC. During the bi-annual review in October 2020, the Board approved the syllabi for those surveying courses we are offering to meet the (c)(2) requirements. The math for the PBC requires Trigonometry or above, statistics, and analytical geometry or a calculus course. The minimum of eleven semester hours of math are usually covered under the engineering bachelor's degree and transferred over as credits for the PBC. However, if they were not taken with the engineering degree, they are required under the PBC. Depending on which of the optional courses in analytical geometry or calculus are taken, they will go most of the way if not all of the way in meeting the supplemental math requirements. If they are slightly shy of the requirement based on the optional calculus class taken, one of the surveying calculations classes could count toward the math, and because there is an extra surveying course in the PBC, the surveying hours would still be met. The Board is not going to, carte blanche, state that the PBC meets their educational requirements, but will review the course work of all of one's transcripts including the ones leading to their engineering degree and the transcripts in which the student is gaining supplemental course work to ensure they contain all of the required categories and hours.

- d. Bachelor's Degree in a Non-Surveying Curriculum or Non-Engineering Curriculum of Four of More Years. For an applicant to receive credit for a non-surveying or non-engineering Bachelor's Degree of four or more years as specified in section 12-120-313(2)(b)(IV)(B), C.R.S., the curriculum must be a minimum of 120 semester hours, or the equivalent and must contain, or be supplemented with, all of the following course work:
 - (1) A minimum of twenty-two semester hours, or the equivalent, consisting of technological and/or business courses.
 - (2) A minimum of eleven semester hours, or the equivalent, consisting of college-level mathematics. Trigonometry, survey computations, statistics, and/or probability will count toward this requirement. Business math, college geometry and college algebra will not count toward this requirement.
 - (3) A minimum of eleven semester hours, or the equivalent, consisting of basic sciences.

- (4) A minimum of twenty-four semester hours, or the equivalent, consisting of: basic surveying, boundary law, description writing, public land survey system, surveying sciences, surveying practice, ethics.

Note that our Post Baccalaureate Certificate program fulfills many of these requirements. One must take a close look at the curriculum in which the bachelor's degree was received to verify that the degree contains enough of the technological and/or business courses. This route also takes the basic science out of the 24 semester hours of surveying courses and makes a separate category for it and the transcripts need to be evaluated to verify that this science requirement is also met. Most bachelor's degrees have a certain amount of basic science required and this Board Rule requirement is often met. However, the real area of concern is the 22 semester hours of technological and/or business courses and any shortfalls in science. Many of the BS types of degrees meet these requirements, but several of the BA degrees and a few of the BS degrees may not fulfill these requirements. The Board staff was kind enough to give me an internal Board Memo consisting of 9 pages of courses they are counting as technological or business. Of course, this is 10 years old now. I remind you that **only the Board can make the decision of what courses will count for what.** I find that most science types of degrees meet these requirements, but such degrees as history, literature, fine arts, etc. may not have the supplemental 22 hours of technological or business required and may be shy on the science. For those students, I typically suggest they consider the AAS since most of the general ed, physical ed, and perhaps some science and math courses will be able to be transferred. That leaves them with the common eight surveying courses common to the AAS and PBC, the math classes of Trig, statistics, and calculus (if not already taken), physics, a couple of AutoCAD classes, Cartography, and GIS. When one applies to WCCC for admissions, they must provide their transcripts of any previous education. These will be evaluated by the school to see what courses may be applied to the requisite courses for the programs. Often, those in the Registrar's office reach out to me for my input. Occasionally, I may need to re-evaluate some courses for which the Registrar's office gives credit but as electives to see if any may count instead as one or some of the program requirements. On occasion when a student may have some previous surveying courses from other schools, I may ask the student to provide me with the syllabi of these courses so that I can compare against our (WCCC's) requirements. There are times that this process is akin to comparing apples to oranges. I make my best decision of what may count for what without overburdening the student with extra courses, while ensuring the student truly gets a proper surveying education. I must also consider how these credits relate to the law and Board Rules as far as hours and categories of education.

As part of our curriculum for both programs, we have certain surveying (SURV) courses taught by our department. The other courses for general education, kinesiology (PE and health), science, math, AutoCAD, cartography, and GIS are given in their own departments. Except for some math requirements, most of the other courses are part of the AAS and not part of the Post Baccalaureate Certificate program.

Of the surveying (SURV) courses, eight are common to both the AAS and PBC. The PBC has one more (ninth) course of SURV 298 – Capstone or Intern course of 4 credit hours. This basically is the final course consisting of a major surveying project agreed upon between the student and the instructor to show that they really do know how to survey.

All nine of the SURV courses are offered in both a campus venue and a distance learning venue, so that we can readily accommodate those that need the education, but still need to work and are not able to travel to Grand Junction for the campus courses. Many of the other courses for the AAS are also available as distance learning but check with each individual instructor to verify whether these are available as distance learning or not. For those that cannot be fulfilled as distance learning from WCCC/CMU, we recommend they be taken at a college or community college near one's home and have the courses transferred upon completion. Because many of the course offerings are on alternate

semesters, please check the sequencing of courses so a critical course is not missed that may not be given for another year.

If one is working full time, has family obligations (or at least a social life outside school and work), and is going to school, I recommend that courses be limited to about two classes per semester. The rule of thumb is that for every credit hour of a class, one should be spending 3 hours of work. Hence if one takes two 3-hour classes, there could easily be 15 to 20 hours of extra work on top of a 40-hour to 60-hour work week, and family obligations. I don't want to see the wheels fall off anywhere due to an over commitment, whether that is at school, at work, or with family.

Of course, for those with a bachelor's degree in a non-surveying or non-engineering curriculum of four or more years, there is no Board rule that you must have the PBC. You just must prove you have successfully completed the course work as stated in the Board Rules. That also means, especially in the area of the surveying requirements, all of the categories listed need to be covered. Check the syllabi of the classes you have taken and ensure the syllabi includes descriptions that correspond to the category. As an example, our SURV 206 - Property Law – Boundary Evidence class takes about 1/3 of the semester on the PLSS, while SURV 203 – Legal Aspects of Surveying covers the PLSS in at least two of its chapters over two weeks, and SURV 204 – Real Property Descriptions has one chapter over one week devoted to the PLSS. All told, a little over 1/2 of a semester is spent on the details of the PLSS among all three courses, but the words “Public Land Survey Systems” appears nowhere in the titles of any of the three courses. You must be able to demonstrate to the Board that your coursework covers the PLSS.

My recommendation, of course, is that for those with the non-surveying or non-engineering bachelor's degree, one should minimally complete the PBC rather than cherry pick courses to meet the AES Board's minimum requirement. My goal is to ensure they know how to survey, not just meet the state's minimum requirements. In some cases, those with a few years of experience, but with a non-surveying or non-engineering degree, have been taught by mentors. Many mentors are superb. However, unfortunately a small number are not as knowledgeable in all areas of surveying as they need to be, especially on the boundary law side of surveying.

Now as you personally strive for licensure as a Professional Land Surveyor in Colorado, regardless of which route you take, you need to be your own best advocate on your experience and on your education. As you fill out your experience credentials to send to NCEES and have your PLS supervisor attest, ensure you cover the variety of work you have really done. When it comes to education, review your own transcripts carefully. For those with the non-surveying or non-engineering bachelor's degree, as you evaluate your course work, look for what will fulfill those 22 hours of technological and/or business courses, what will fulfill the math requirements as specified, what will fulfill the science requirements, and what will fulfill the surveying course requirements. One may be only another course or two shy of meeting that requirement, or may want to go the AAS route which will count as the approved 2-year surveying curriculum. Also, if you start in the PBC program, you can always switch to the AAS program without losing any credit for the surveying courses you already took. I've had some students with a bachelor's degree in engineering or other technical field but lacked experience in AutoCAD and GIS who chose to go the AAS route anyway to ensure they have full exposure to the full geomatic sciences side of their education.

When it comes time to apply to the Board for your State Specific test for licensure, as your own best advocate, I would recommend you include a letter with table or spreadsheet attachments of your assessments and where your experience and/or education meets what requirement in the Board Rules. Recognize the early evaluation of your credentials is usually done by staff at the Board, and rightfully so to ensure the Board is not overwhelmed with work. (In reality, the Board is already overwhelmed with work and must rely upon their staff for assistance). Make it easy for them to follow. If they must dig

through all of the transcripts and make their own evaluation, they may easily miss something. By providing them with a road map of what you have accomplished in the way of experience and education, hopefully, you will be successful in meeting the requirements. Should you receive word back saying that you still do not have the requisite experience or education, because of the detail you provided, they should be able to respond to your particular short comings rather than a general statement of “you need more boundary work” or “you need more education”.

Note the Board cannot go outside the bounds of the law or their Board Rules. However, if you have done everything you can to make it easy for them to evaluate your credentials, and you still believe you meet the criteria, you have the option of requesting a hearing with the Board. Your detailed assessment should go a long way in either convincing them that you are qualified, or it should allow them to be quite specific about what additional experience or education you need.

Remember the Board is not your enemy. They have an obligation to protect the public by ensuring licensees are truly qualified. They have certain laws and guidelines they must follow. They don't have the leeway to vary those, because “it is the law”. But if you have made an honest assessment of your experience and education credentials, compared that with the laws and Board Rules, and made a professional presentation of your credentials to the Board, I suspect the vast majority of you will have no problem. Like anything in life, the success is in the details and the hard work of getting those details met and presented properly.

Good luck out there!